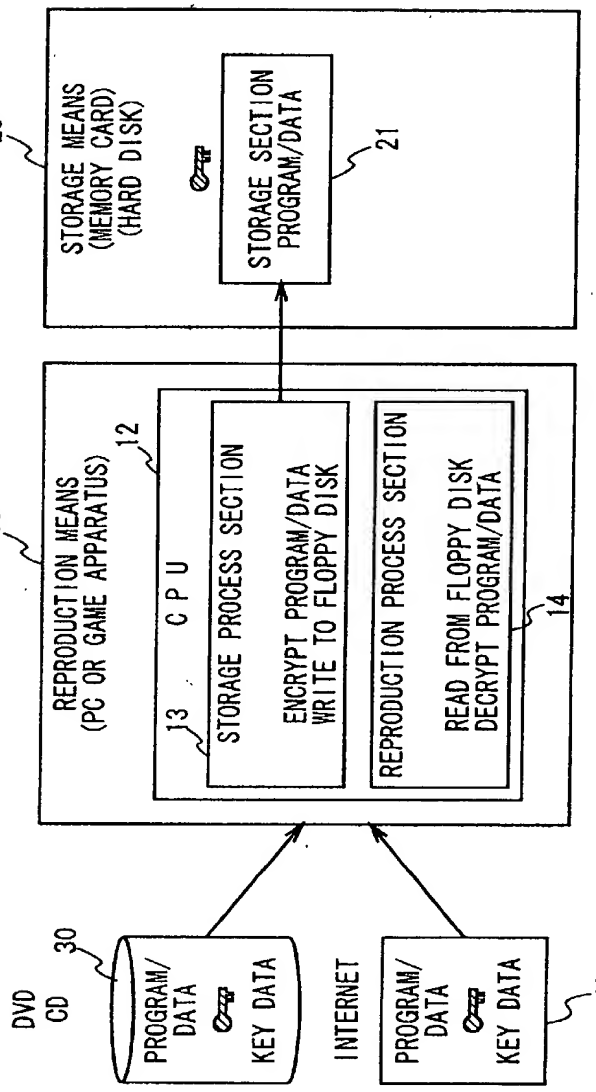

20
STORAGE MEANS
(MEMORY CARD)
(HARD DISK)
21
STORAGE SECTION
PROGRAM/DATA
10
REPRODUCTION MEANS
(PC OR GAME APPARATUS)
12
C P U
13
STORAGE PROCESS SECTION
ENCRYPT PROGRAM/DATA
WRITE TO FLOPPY DISK
REPRODUCTION PROCESS SECTION
READ FROM FLOPPY DISK
DECRYPT PROGRAM/DATA
14
DVD
CD
30
PROGRAM/
DATA
KEY DATA
INTERNET
PROGRAM/
DATA
KEY DATA
40

FIG. 1

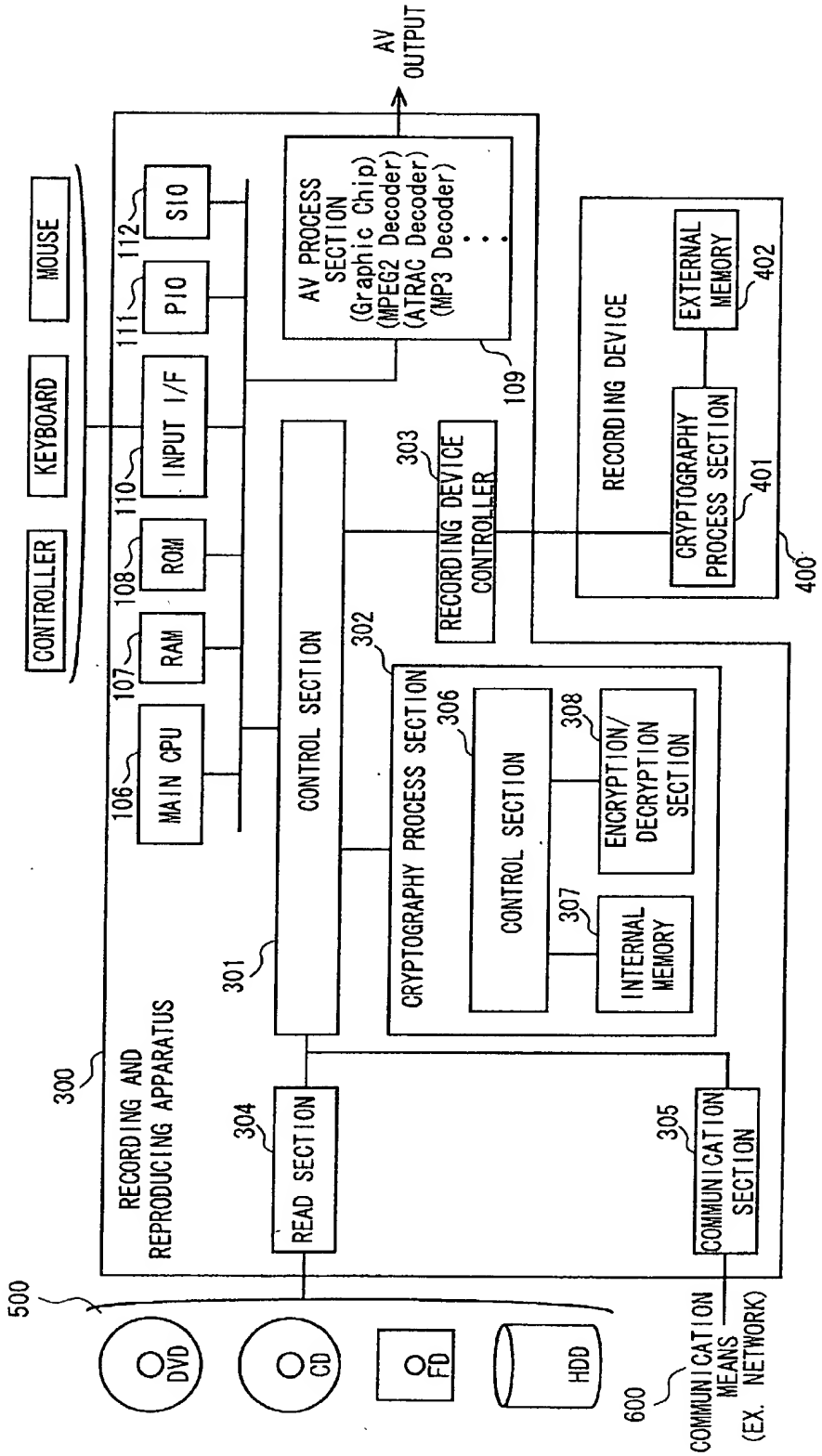

AV OUTPUT
MOUSE
KEYBOARD
CONTROLLER
RECORDING AND REPRODUCING APPARATUS
300
MAIN CPU
106
RAM
107
ROM
108
INPUT I/F
110
PIO
111
SIO
112
CONTROL SECTION
301
AV PROCESS SECTION (Graphic Chip) (MPEG2 Decoder) (ATRAC Decoder) (MP3 Decoder) . . .
109
RECORDING DEVICE CONTROLLER
303
CRYPTOGRAPHY PROCESS SECTION
302
CONTROL SECTION
306
INTERNAL MEMORY
307
ENCRYPTION/ DECRYPTION SECTION
308
READ SECTION
304
COMMUNICATION SECTION
305
RECORDING DEVICE
CRYPTOGRAPHY PROCESS SECTION
401
EXTERNAL MEMORY
402
400
500
DVD
CD
FD
HDD
600
COMMUNICATION MEANS (EX. NETWORK)

FIG. 2

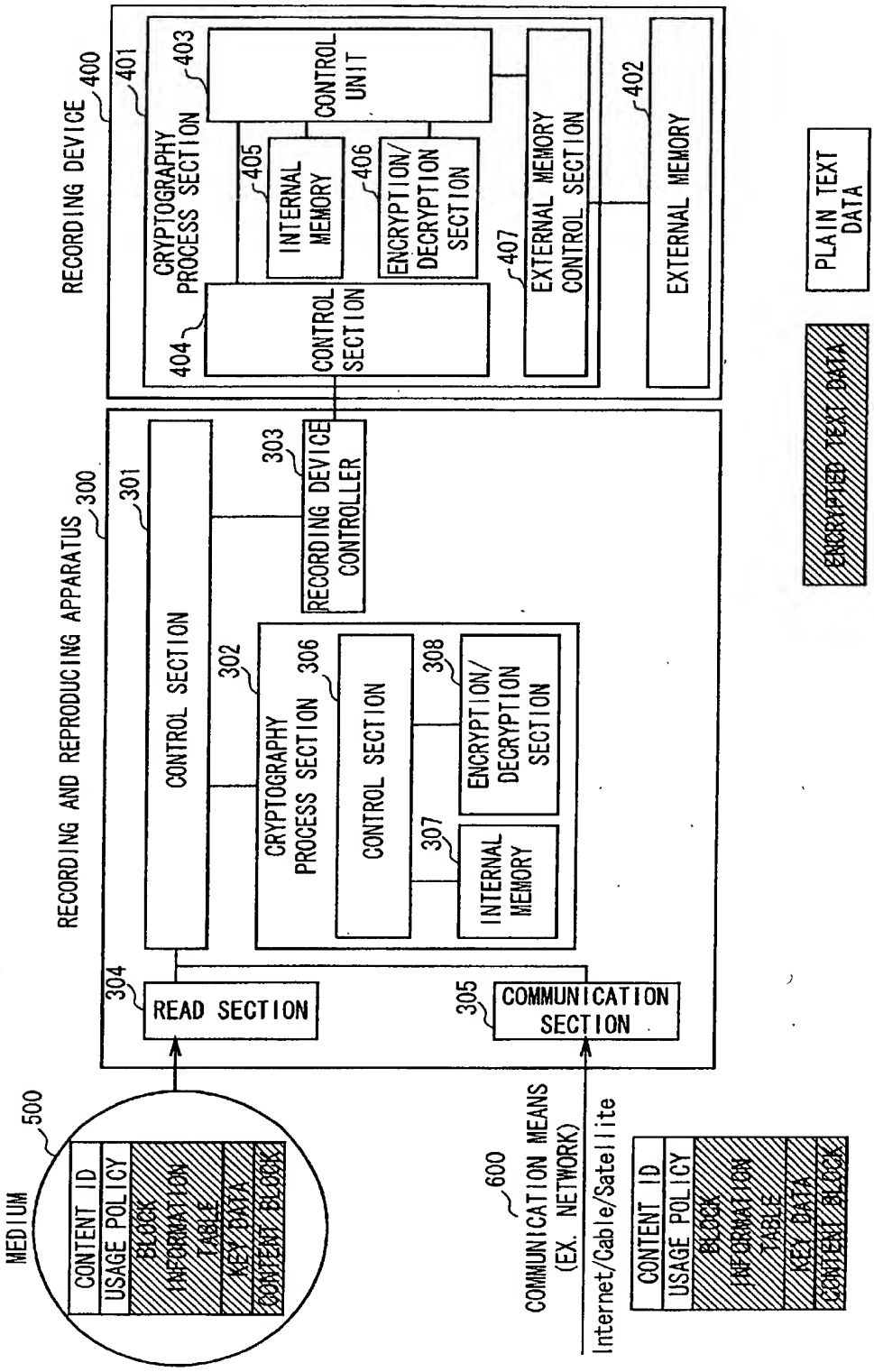
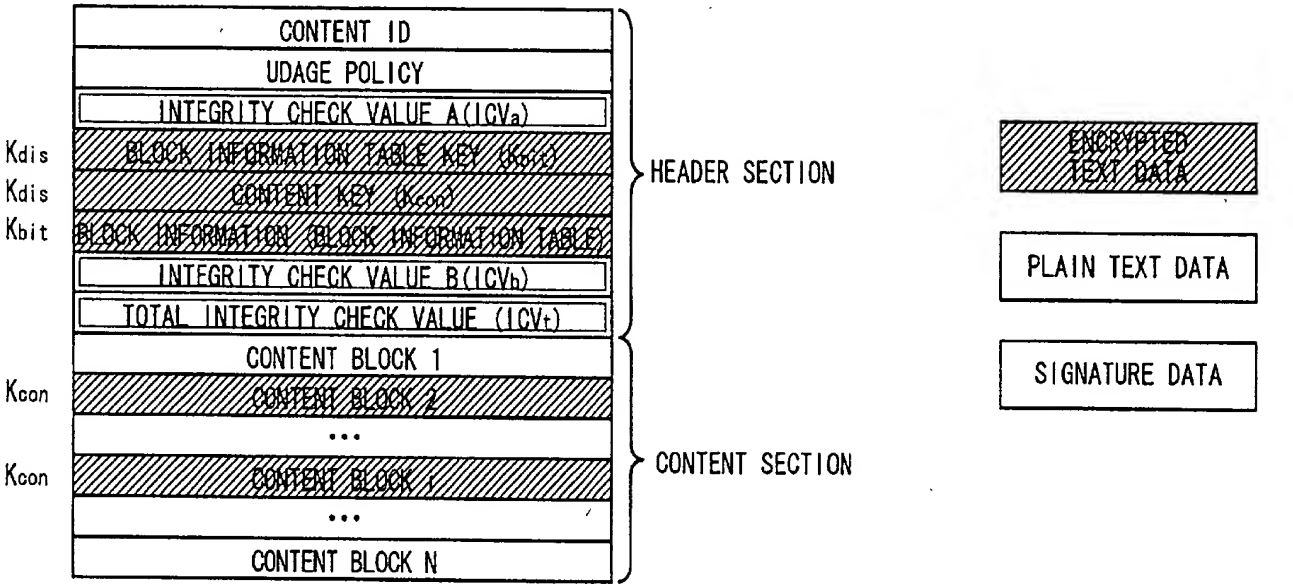

RECORDING DEVICE 400
401
CRYPTOGRAPHY PROCESS SECTION
403
CONTROL UNIT
405
INTERNAL MEMORY
406
ENCRYPTION/ DECRYPTION SECTION
404
CONTROL SECTION
407
EXTERNAL MEMORY CONTROL SECTION
402
EXTERNAL MEMORY
RECORDING AND REPRODUCING APPARATUS 300
301
CONTROL SECTION
303
RECORDING DEVICE CONTROLLER
302
CRYPTOGRAPHY PROCESS SECTION
306
CONTROL SECTION
308
ENCRYPTION/ DECRYPTION SECTION
307
INTERNAL MEMORY
304
READ SECTION
305
COMMUNICATION SECTION
MEDIUM
500
CONTENT ID
USAGE POLICY
BLOCK INFORMATION TABLE
KEY DATA
CONTENT BLOCK
600
COMMUNICATION MEANS (EX. NETWORK)
Internet/Cable/Satellite
CONTENT ID
USAGE POLICY
BLOCK INFORMATION TABLE
KEY DATA
CONTENT BLOCK
ENCRYPTED TEXT DATA
PLAIN TEXT DATA

FIG. 3



DATA FORMAT ON MEDIUM AND COMMUNICATION PATH

FIG. 4

HEADER LENGTH
CONTENT LENGTH
FORMAT VERSION
FORMAT TYPE
CONTENT TYPE
OPERATION PRIORITY
LOCALIZATION FIELD
COPY PERMISSION
MOVE PERMISSION
ENCRYPTION ALGORITHM
ENCRYPTION MODE
INTEGRITY CHECK METHOD

USAGE POLICY

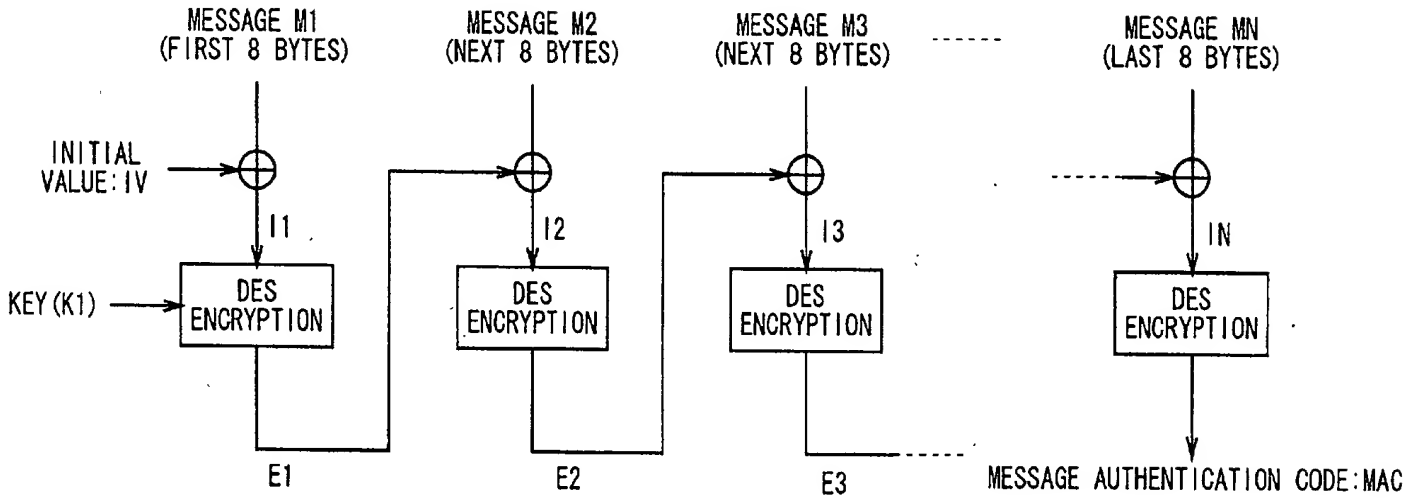
FIG. 5

Kbit

BLOCK NUMBER	
BLOCK 1	BLOCK LENGTH
	ENCRYPTION FLAG
	FLAG TO BE VERIFIED (ICV FLAG)
	ICV1
. . . .	
BLOCK N	BLOCK LENGTH
	ENCRYPTION FLAG
	ICV FLAG
	CONTENT INTEGRITY CHECK VALUE (ICVN)

BLOCK INFORMATION TABLE

FIG. 6



⊕:EXCLUSIVE OR (XOR) PROCESS (8-BYTE UNIT)

FIG. 7

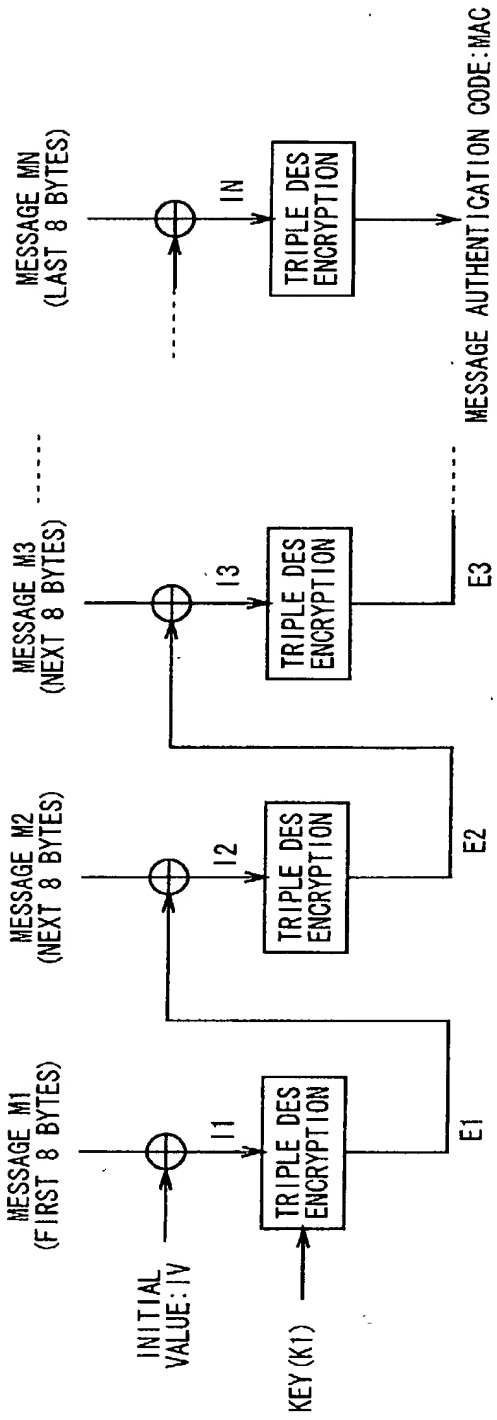

MESSAGE M1
(FIRST 8 BYTES)
MESSAGE M2
(NEXT 8 BYTES)
MESSAGE M3
(NEXT 8 BYTES)
MESSAGE MN
(LAST 8 BYTES)
INITIAL
VALUE:IV
KEY(K1)
I1
I2
I3
IN
TRIPLE DES
ENCRYPTION
TRIPLE DES
ENCRYPTION
TRIPLE DES
ENCRYPTION
TRIPLE DES
ENCRYPTION
E1
E2
E3
MESSAGE AUTHENTICATION CODE:MAC

FIG. 8

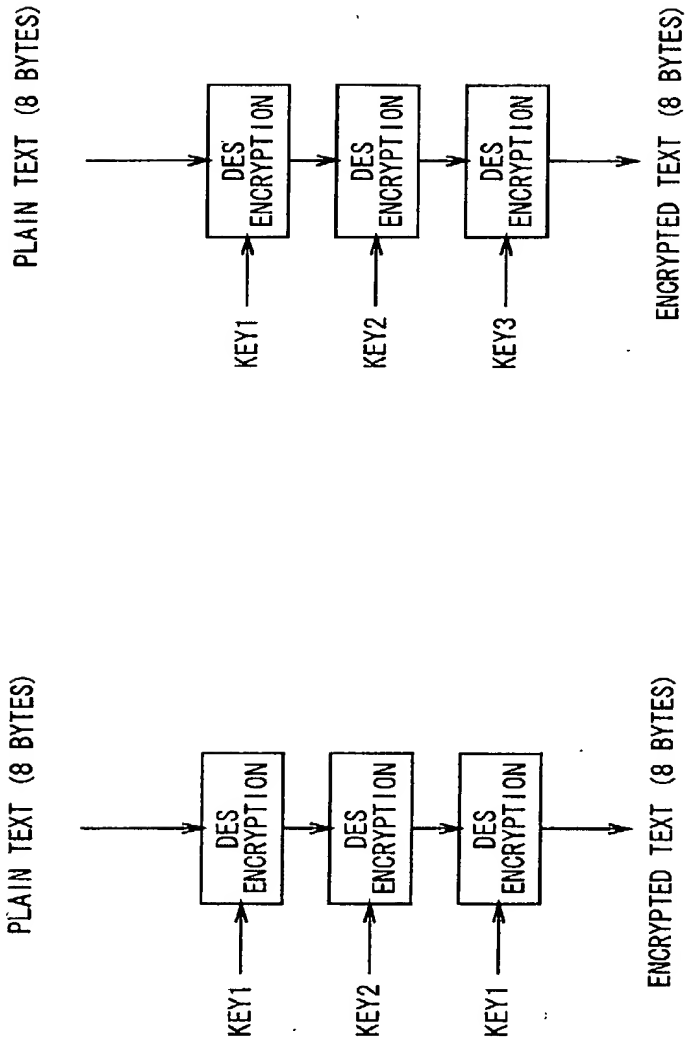

PLAIN TEXT (8 BYTES)
DES ENCRYPTION
DES ENCRYPTION
DES ENCRYPTION
KEY1
KEY2
KEY1
ENCRYPTED TEXT (8 BYTES)
(A)
PLAIN TEXT (8 BYTES)
DES ENCRYPTION
DES ENCRYPTION
DES ENCRYPTION
KEY1
KEY2
KEY3
ENCRYPTED TEXT (8 BYTES)
(B)

FIG. 9

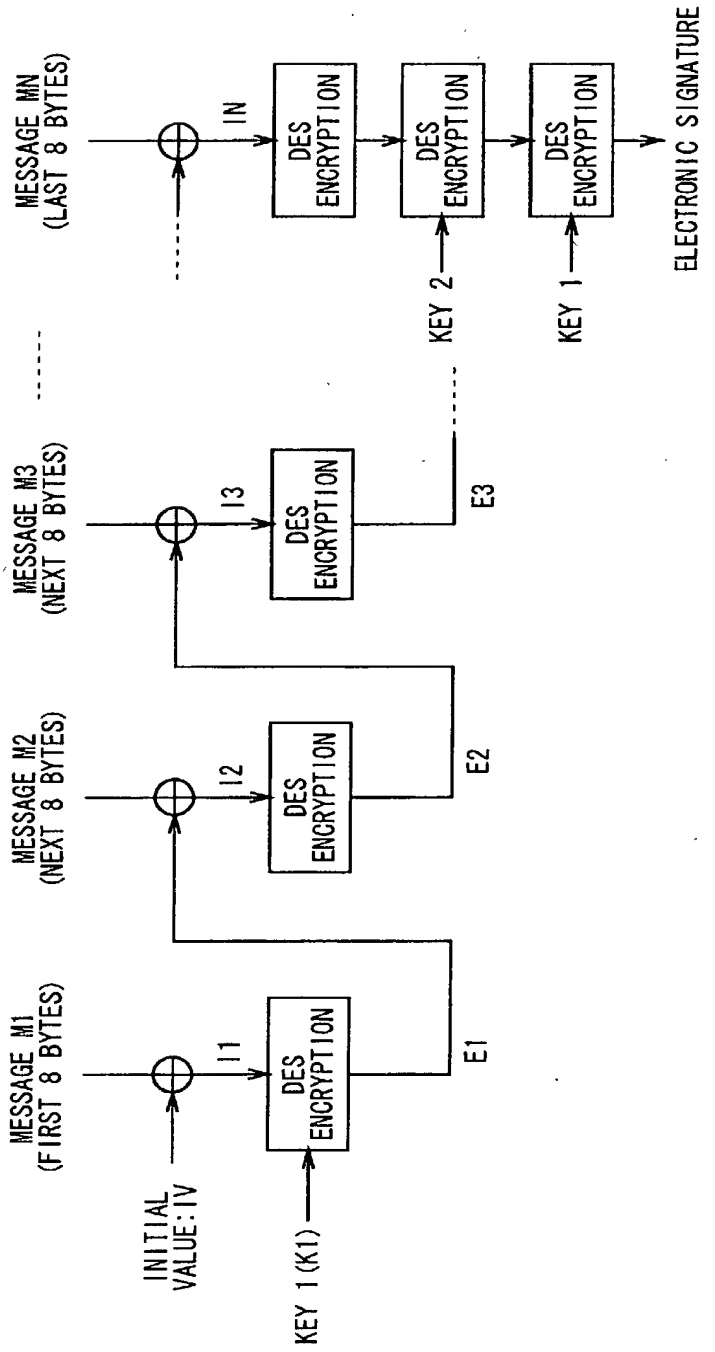
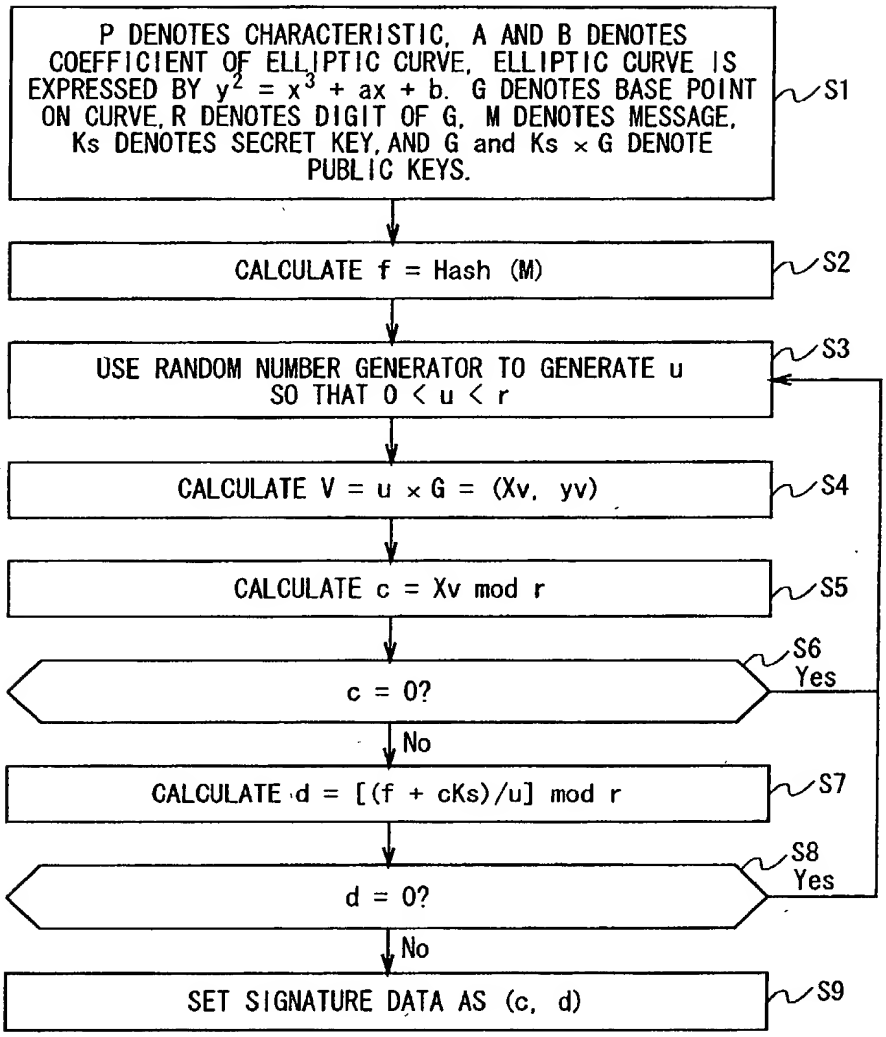

MESSAGE M1
(FIRST 8 BYTES)
MESSAGE M2
(NEXT 8 BYTES)
MESSAGE M3
(NEXT 8 BYTES)
MESSAGE MN
(LAST 8 BYTES)
INITIAL
VALUE:IV
KEY 1 (K1)
I1
I2
I3
IN
DES
ENCRYPTION
E1
E2
E3
KEY 2
KEY 1
ELECTRONIC SIGNATURE

FIG. 10

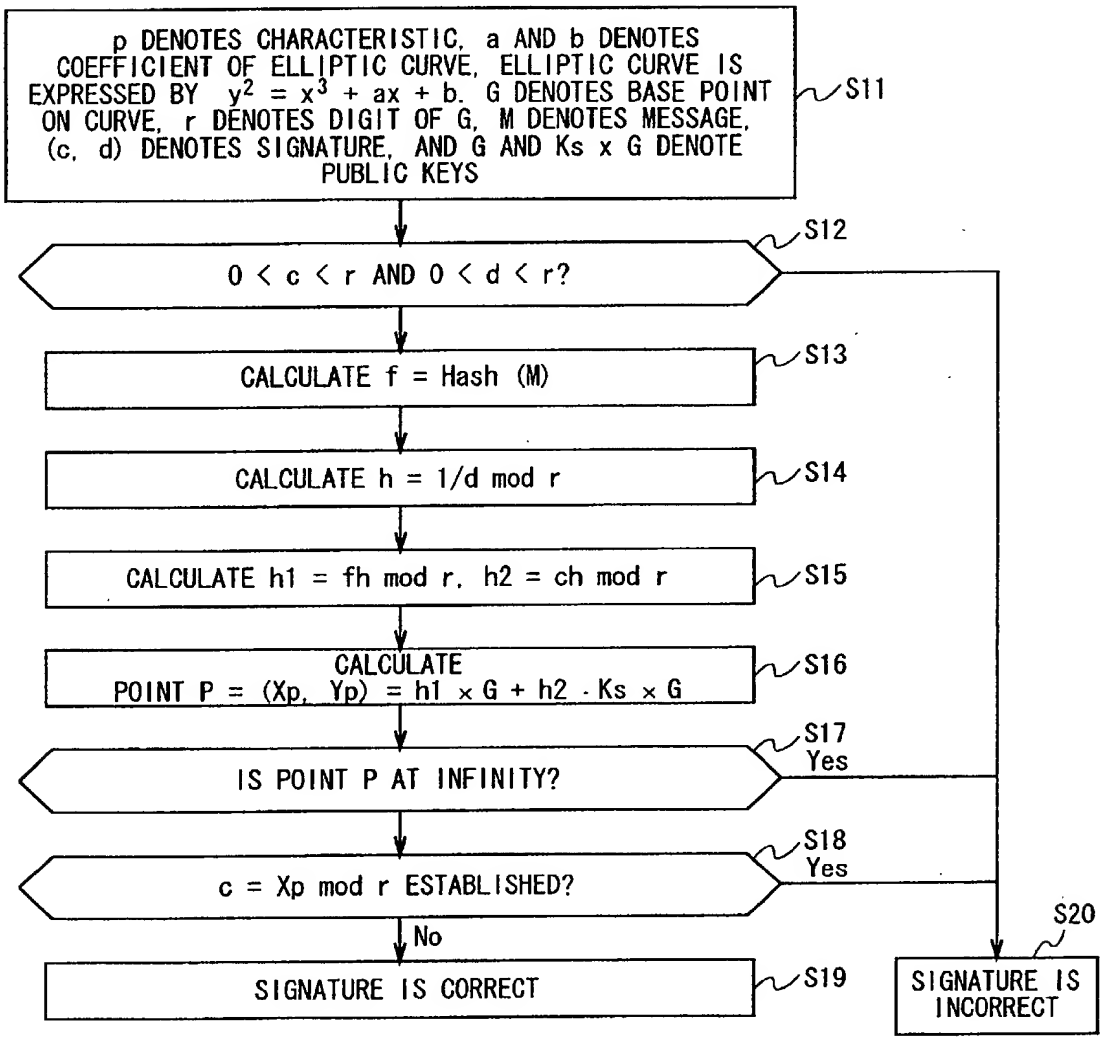
SIGNATURE GENERATION



GENERATION OF SIGNATURE (IEEE P1363/D3)

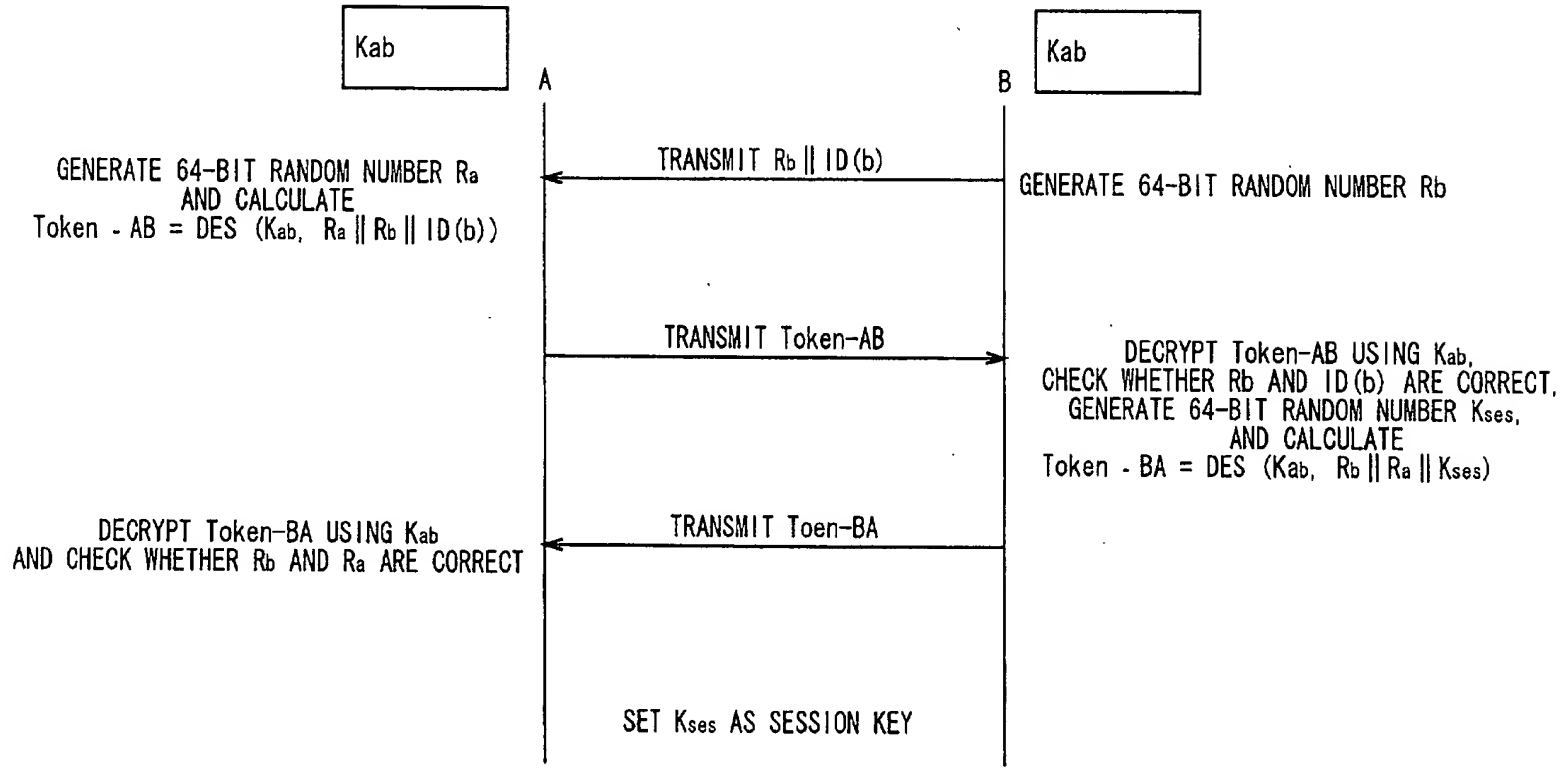
FIG. 11

SIGNATURE VERIFICATION



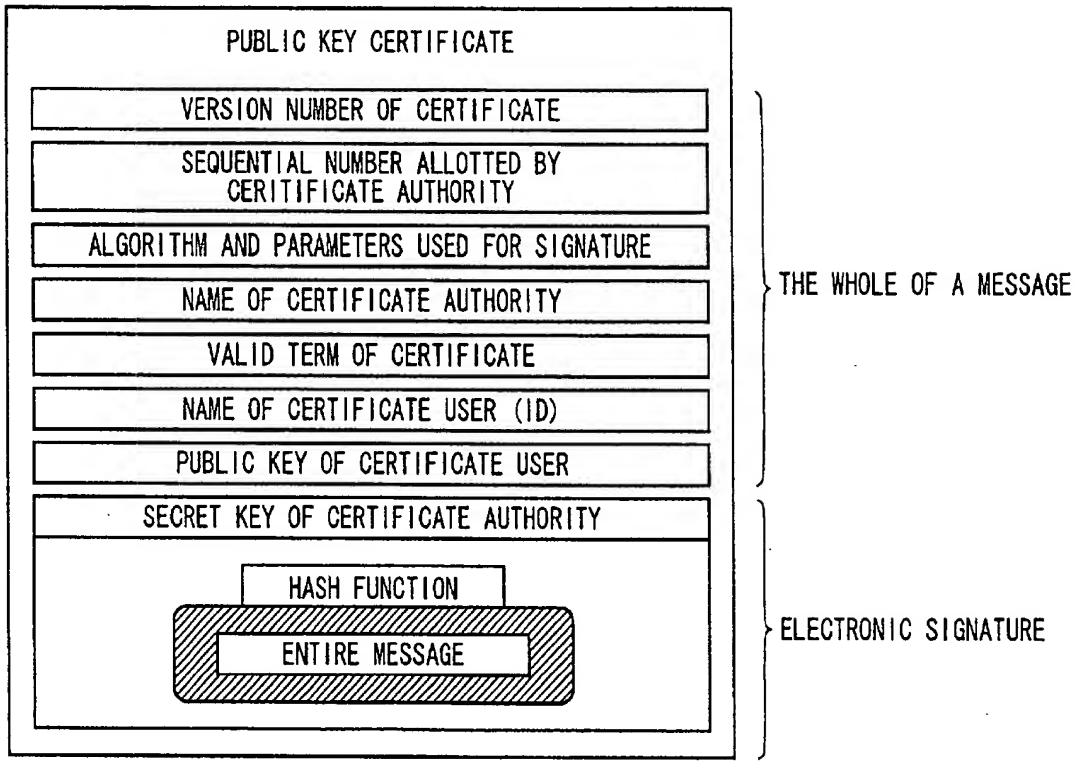
SIGNATURE VERIFICATION(IEEE P1363/D3)

FIG. 12



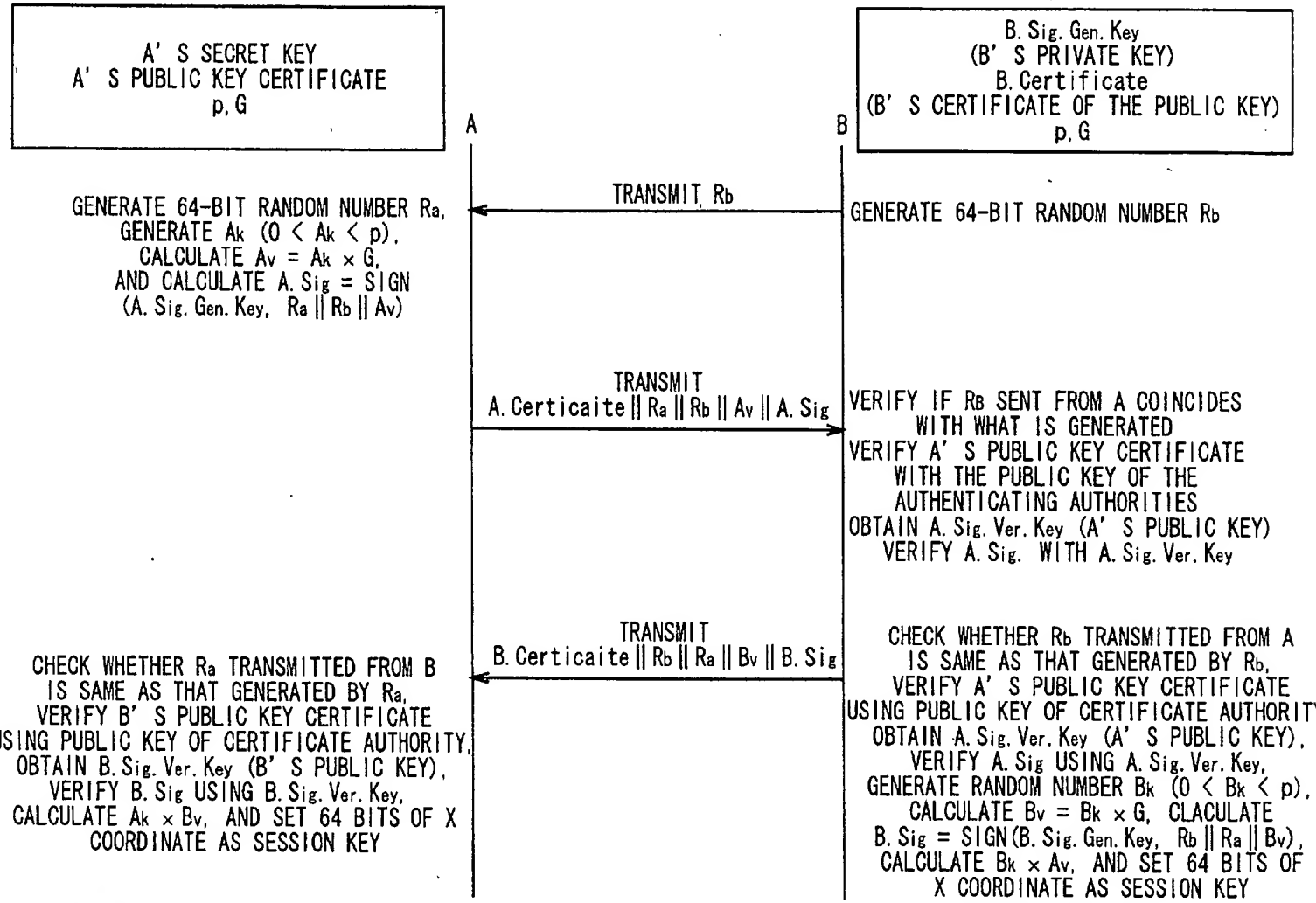
ISO/IEC 9798-2 MUTUAL AUTHENTICATION AND KEY SHARING METHOD USING SYMMETRICAL KEY CRYPTOGRAPHY TECHNIQUE

FIG. 13



PUBLIC KEY CERTIFICATE

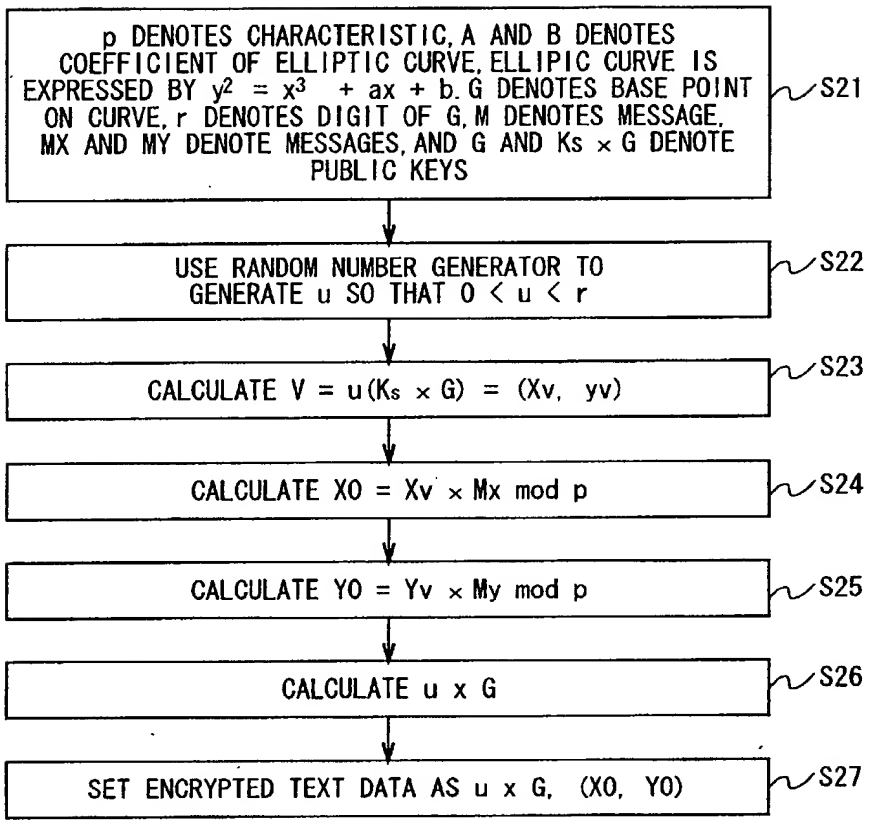
FIG. 14



ISO/IEC 9798-3 MUTUAL AUTHENTICATION AND KEY SHARING METHOD USING SYMMETRICAL KEY CRYPTOGRAPHY TECHNIQUE

FIG. 15

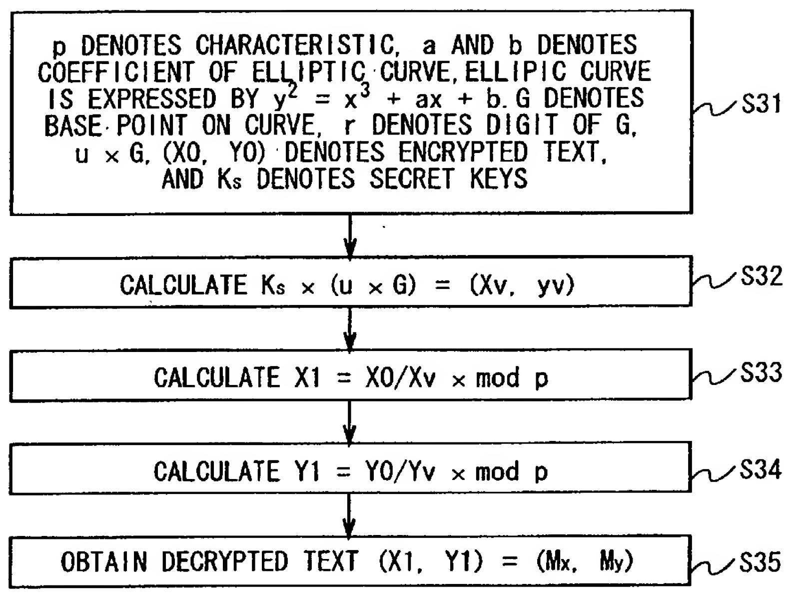
ENCRYPTION



ENCRYPTION USING ELLIPTIC CURVE CRYPTOGRAPHY (MENEZES-VANSTONE)

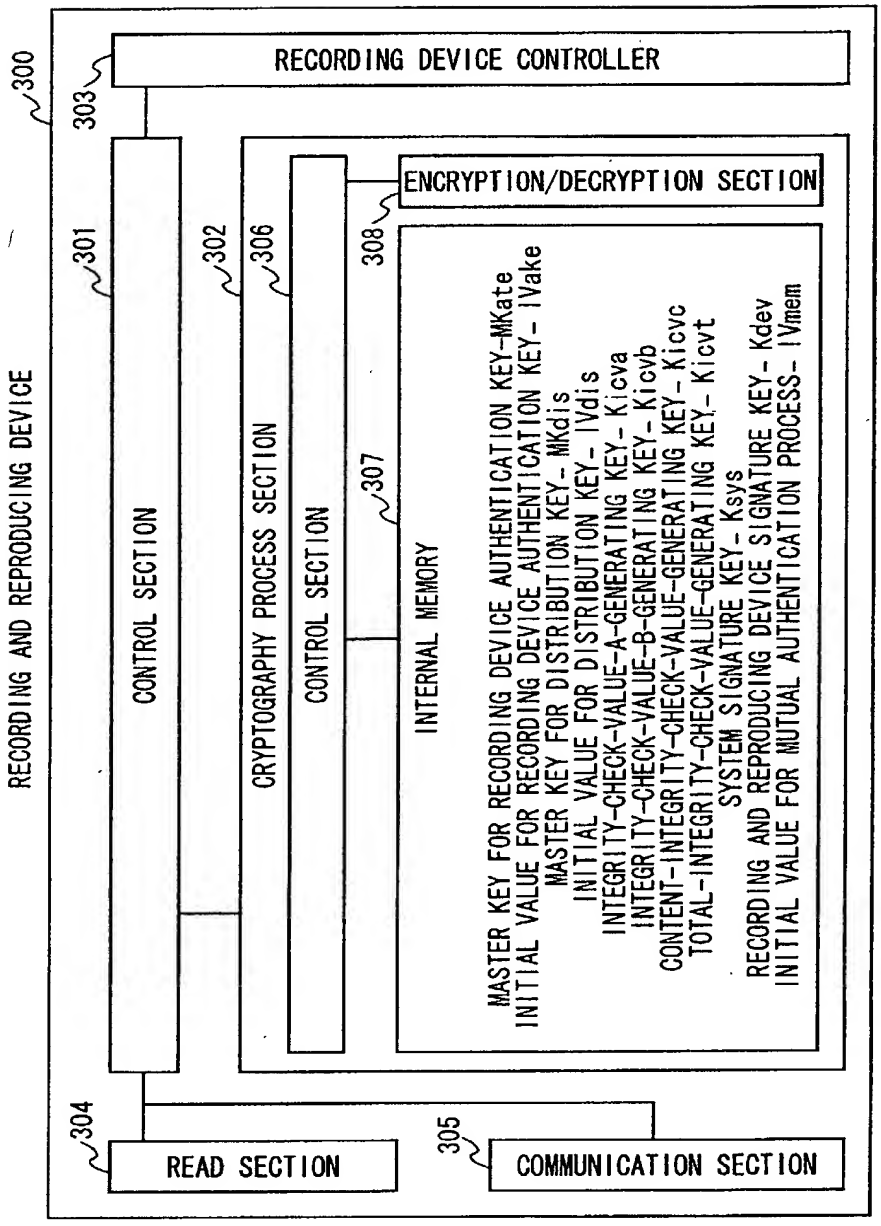
FIG. 16

DECRYPTION



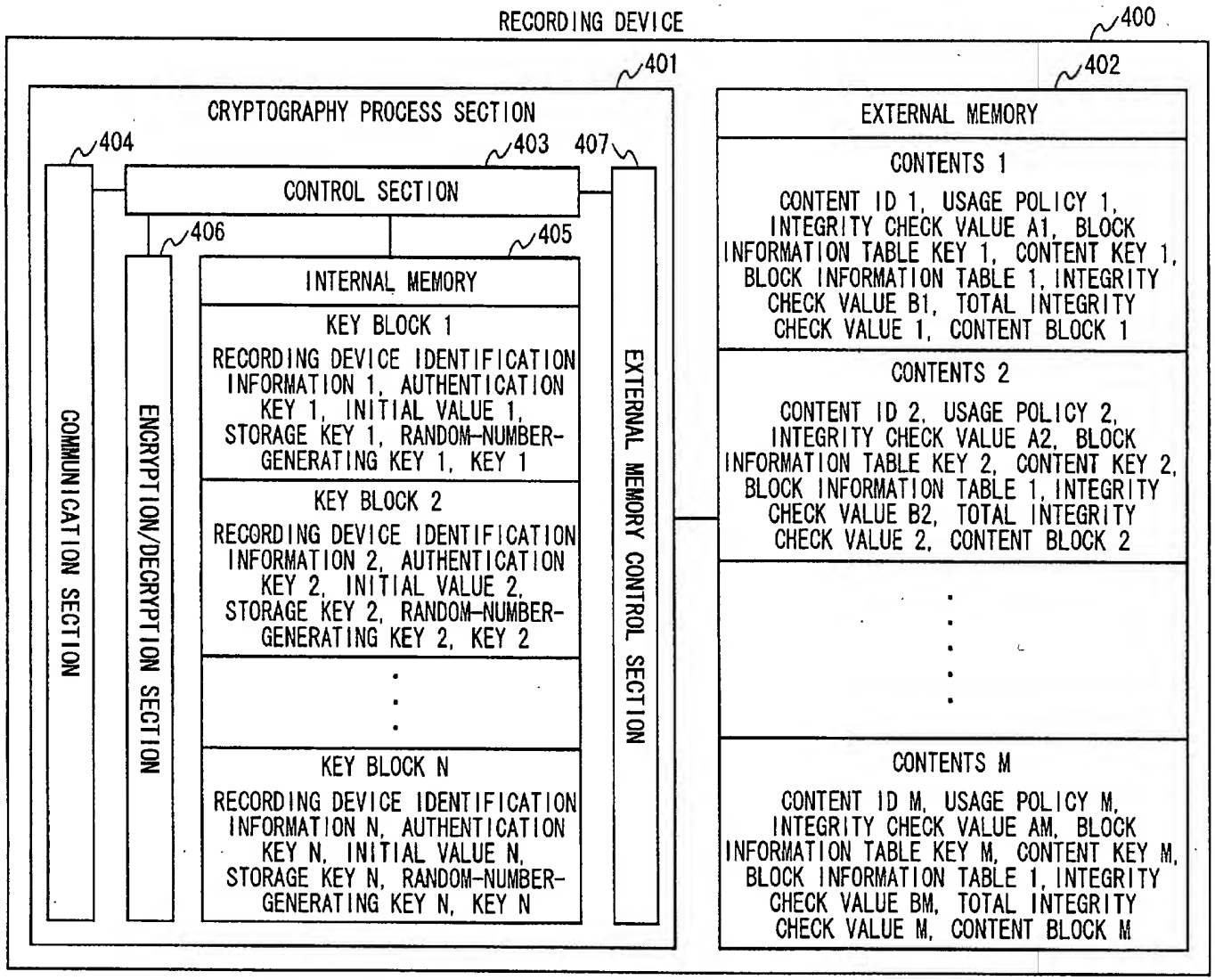
DECRYPTION USING ELLIPTIC CURVE CRYPTOGRAPHY (MENEZES-VANSTONE)

FIG. 17

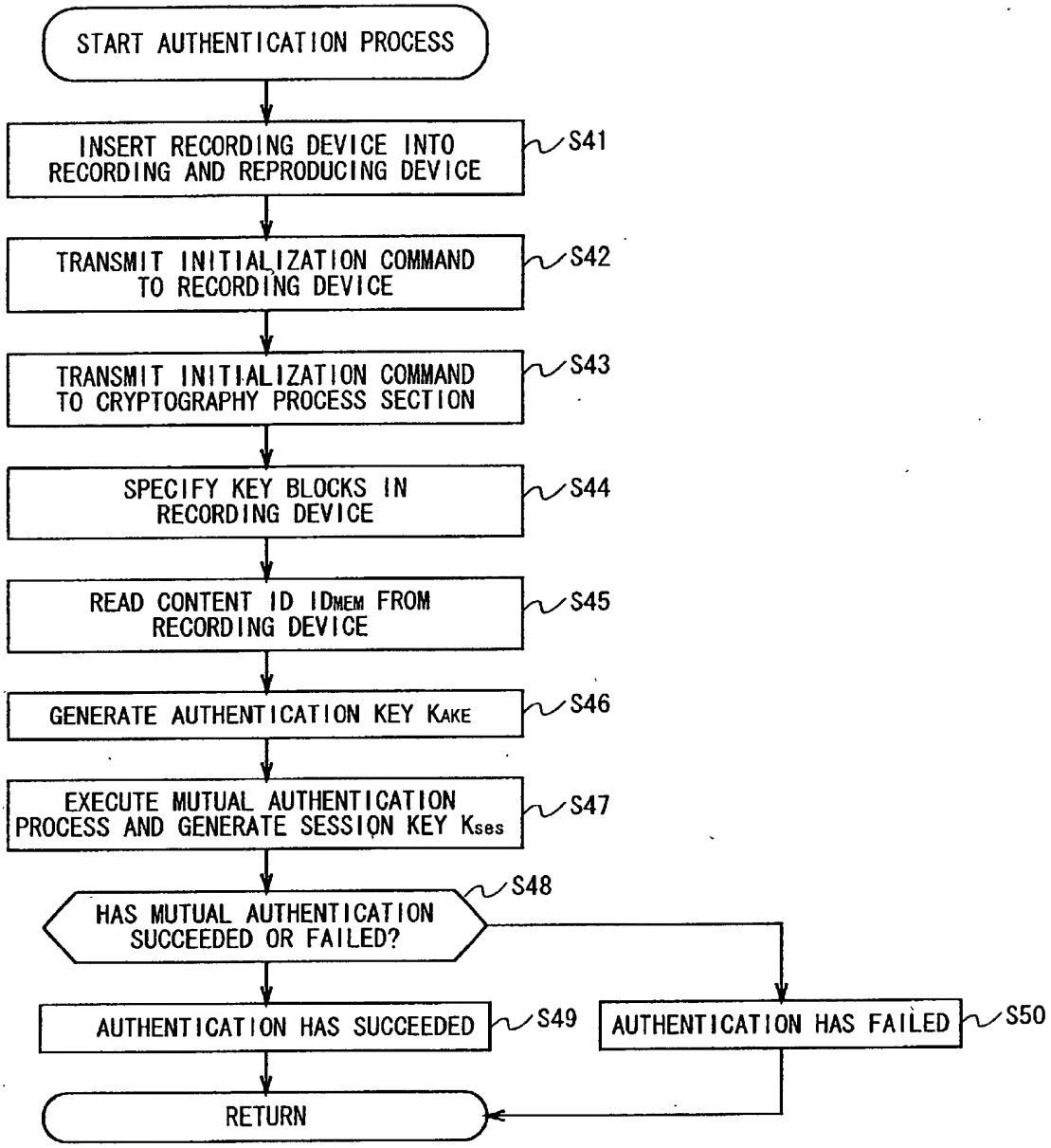


HOW DATA ARE HELD ON RECORDING AND REPRODUCING DEVICE

FIG. 18



HOW DATA ARE HELD ON RECORDING DEVICE FIG. 19



MUTUAL AUTHENTICATION BETWEEN RECORDING AND REPRODUCING DEVICE AND RECORDING DEVICE

FIG. 20

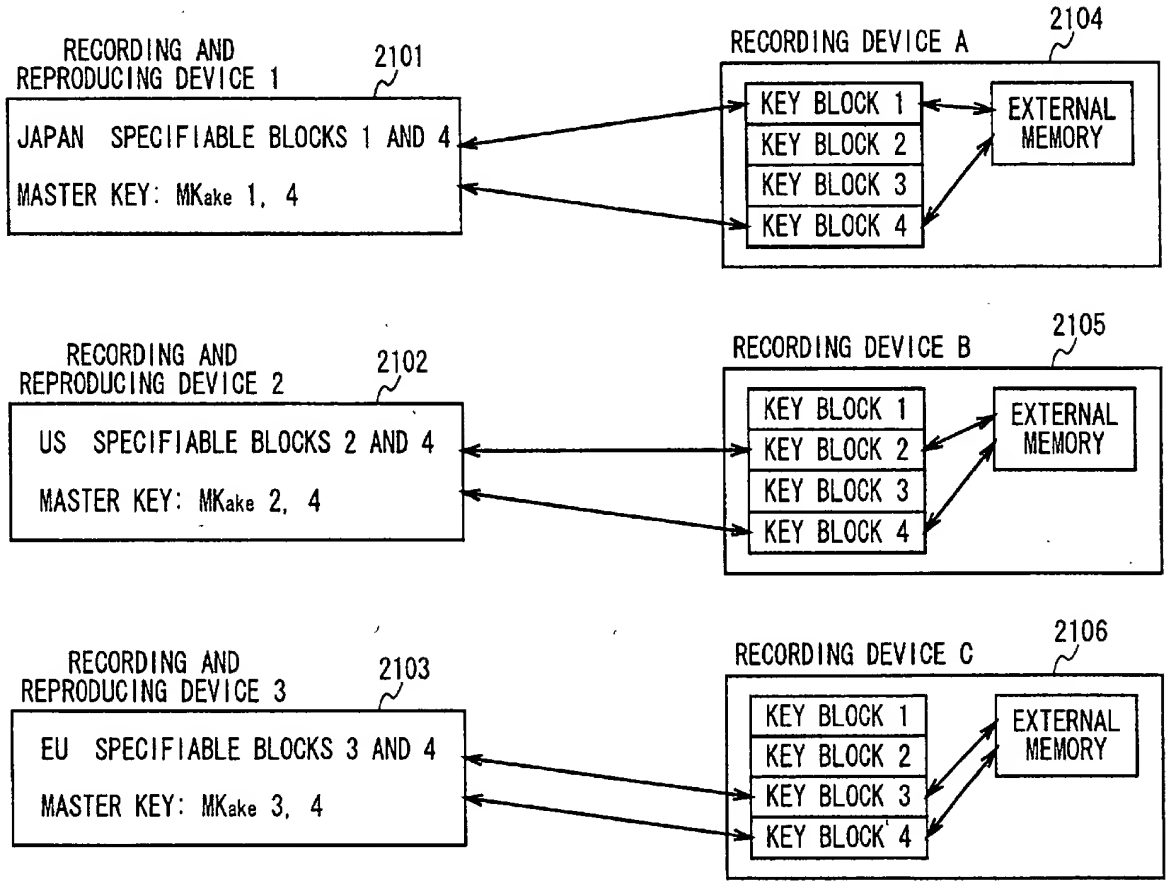
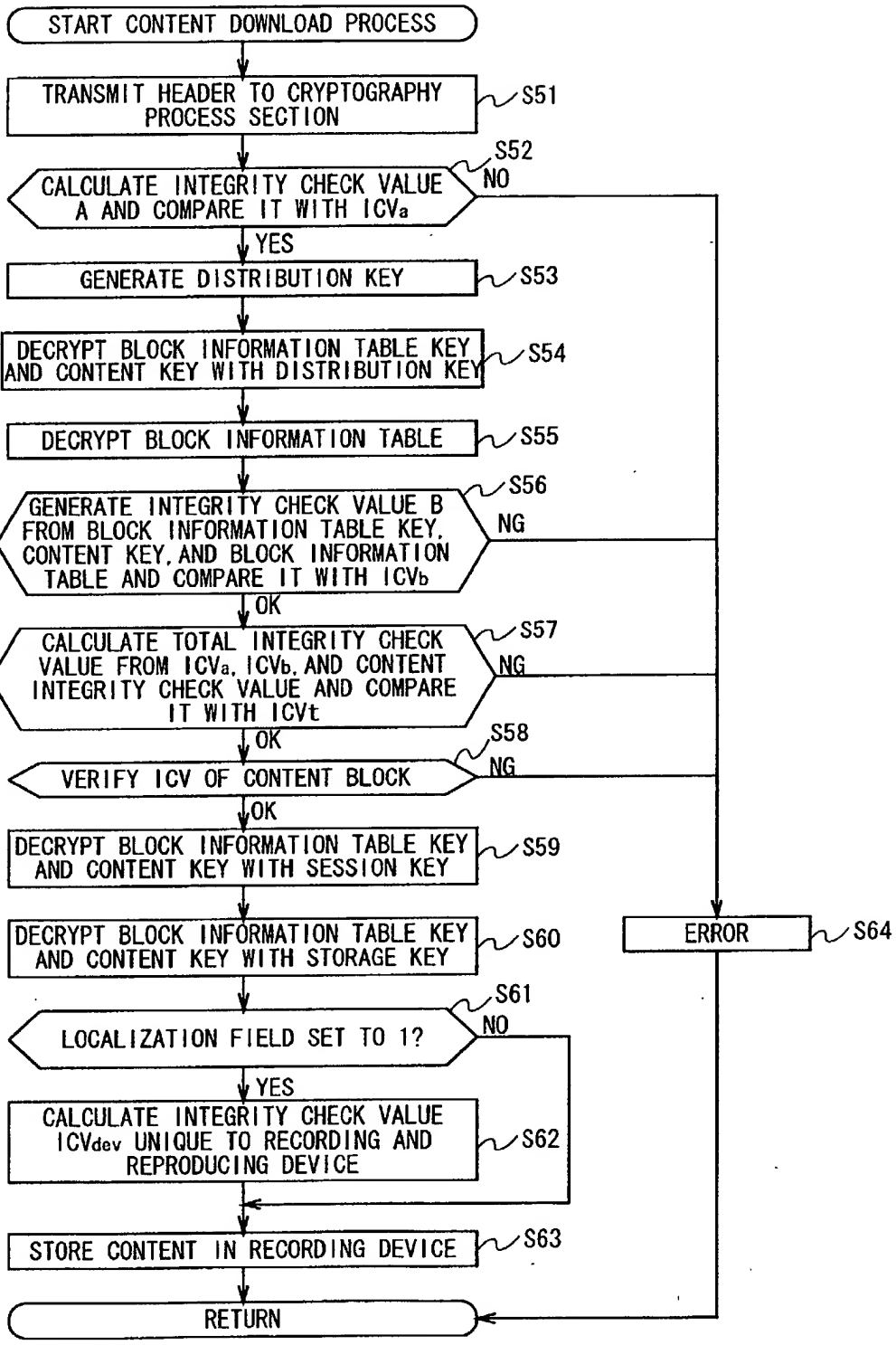
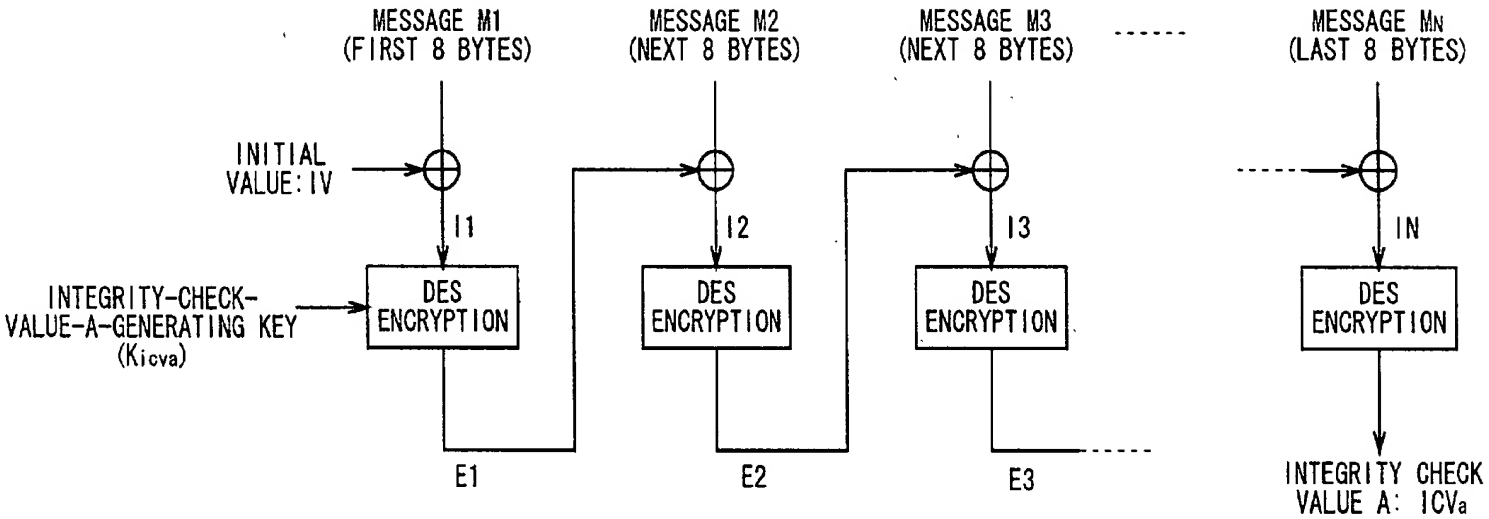

RECORDING AND REPRODUCING DEVICE 1
2101
JAPAN SPECIFIABLE BLOCKS 1 AND 4
MASTER KEY: MKake 1, 4
RECORDING DEVICE A
2104
KEY BLOCK 1
KEY BLOCK 2
KEY BLOCK 3
KEY BLOCK 4
EXTERNAL MEMORY
RECORDING AND REPRODUCING DEVICE 2
2102
US SPECIFIABLE BLOCKS 2 AND 4
MASTER KEY: MKake 2, 4
RECORDING DEVICE B
2105
KEY BLOCK 1
KEY BLOCK 2
KEY BLOCK 3
KEY BLOCK 4
EXTERNAL MEMORY
RECORDING AND REPRODUCING DEVICE 3
2103
EU SPECIFIABLE BLOCKS 3 AND 4
MASTER KEY: MKake 3, 4
RECORDING DEVICE C
2106
KEY BLOCK 1
KEY BLOCK 2
KEY BLOCK 3
KEY BLOCK 4
EXTERNAL MEMORY

FIG. 21



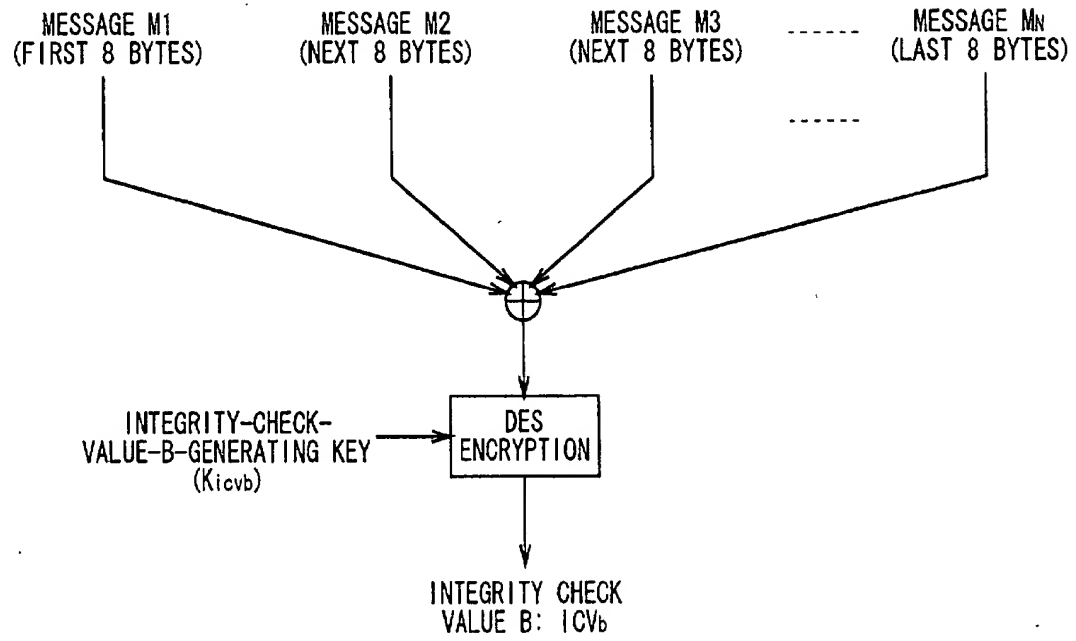
CONTENT DOWNLOAD PROCESS FIG. 22



MESSAGES M1 TO MN: CONTENT ID AND USAGE POLICY

⊕:EXCLUSIVE OR PROCESS (EVERY 8 BYTES)

FIG. 23



MESSAGES M1 TO MN: BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon, AND BLOCK INFORMATION TABLE

⊕:EXCLUSIVE OR PROCESS (EVERY 8 BYTES)

FIG. 24

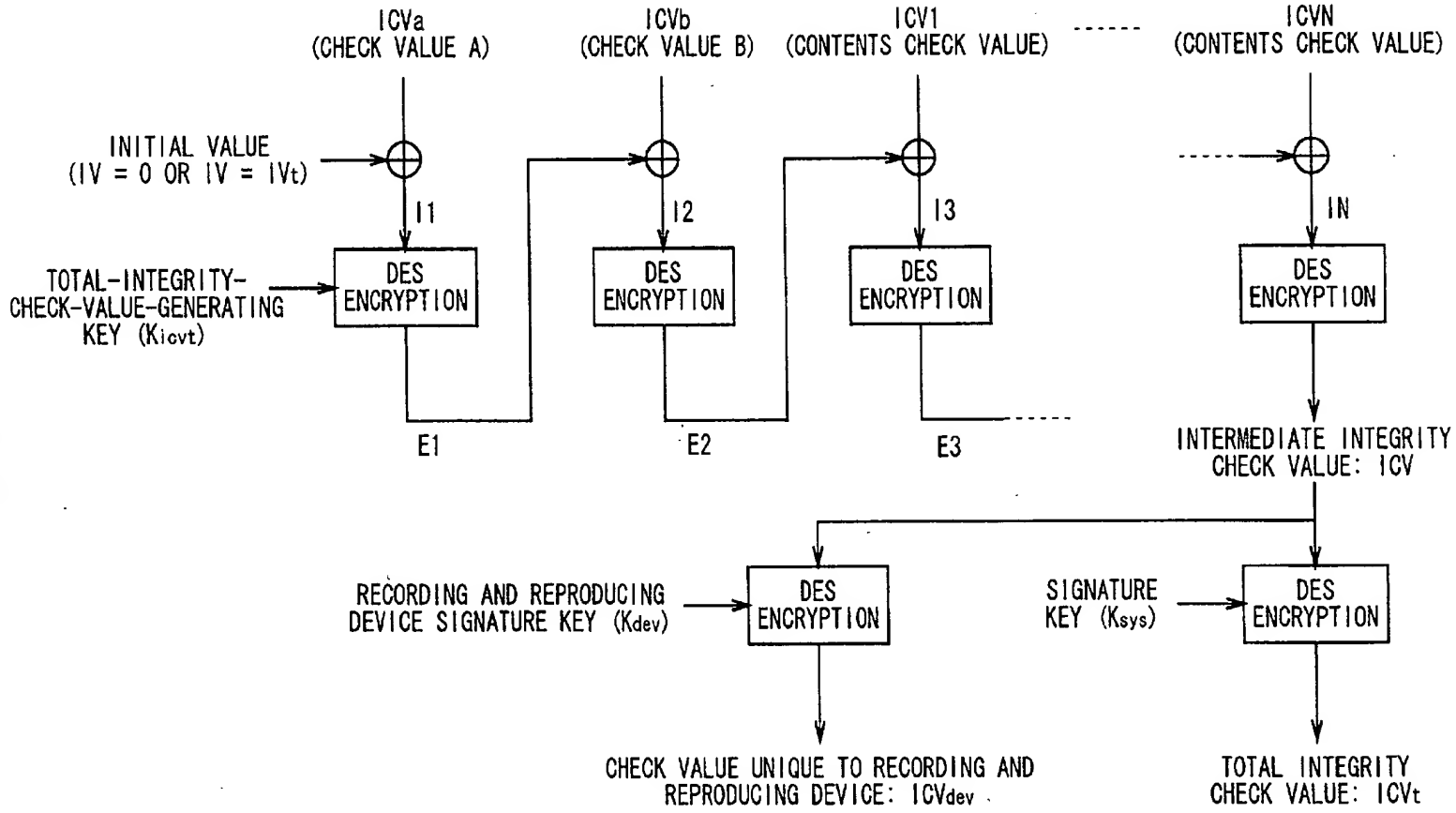
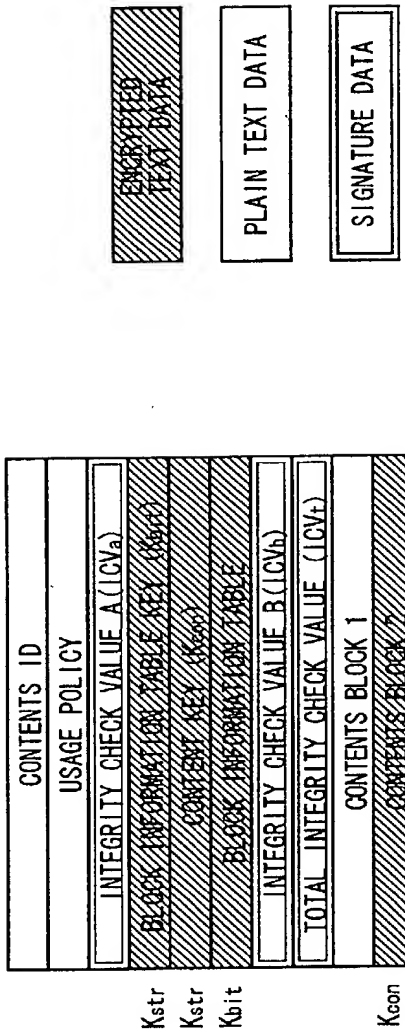
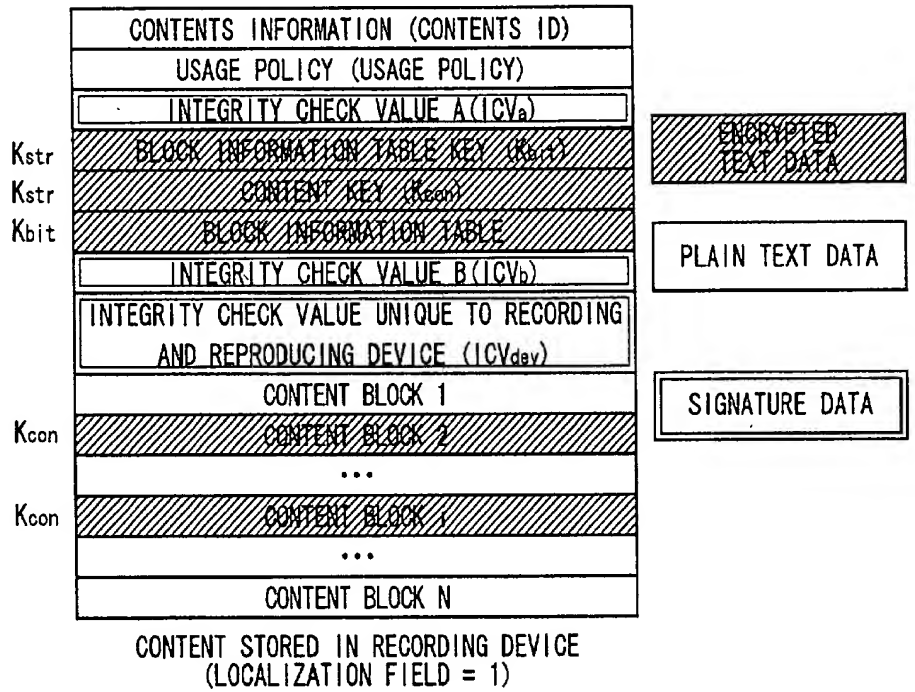

ICVa
(CHECK VALUE A)
ICVb
(CHECK VALUE B)
ICV1
(CONTENTS CHECK VALUE)
ICVN
(CONTENTS CHECK VALUE)
INITIAL VALUE
(IV = 0 OR IV = IVt)
I1
I2
I3
IN
TOTAL-INTEGRITY-CHECK-VALUE-GENERATING KEY (Kicvt)
DES ENCRYPTION
DES ENCRYPTION
DES ENCRYPTION
DES ENCRYPTION
E1
E2
E3
INTERMEDIATE INTEGRITY CHECK VALUE: ICV
RECORDING AND REPRODUCING DEVICE SIGNATURE KEY (Kdev)
SIGNATURE KEY (Ksys)
DES ENCRYPTION
DES ENCRYPTION
CHECK VALUE UNIQUE TO RECORDING AND REPRODUCING DEVICE: ICVdev
TOTAL INTEGRITY CHECK VALUE: ICVt
⊕:EXCLUSIVE OR PROCESS (EVERY 8 BYTES)

FIG. 25



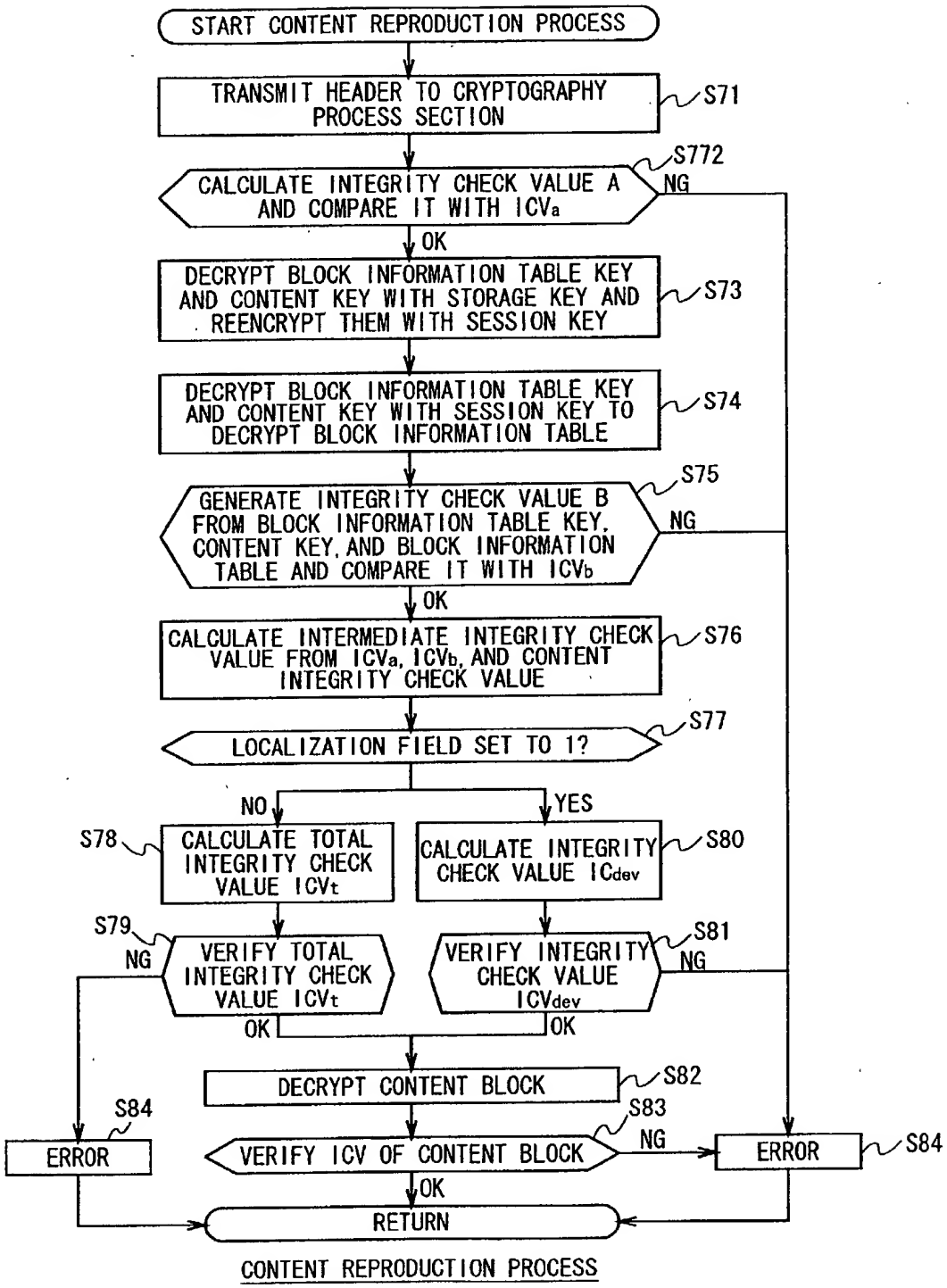
CONTENT STORED IN RECORDING DEVICE
(LOCALIZATION FIELD = 0)

FIG. 26



CONTENT STORED IN RECORDING DEVICE
(LOCALIZATION FIELD = 1)

FIG. 27



CONTENT REPRODUCTION PROCESS

FIG. 28

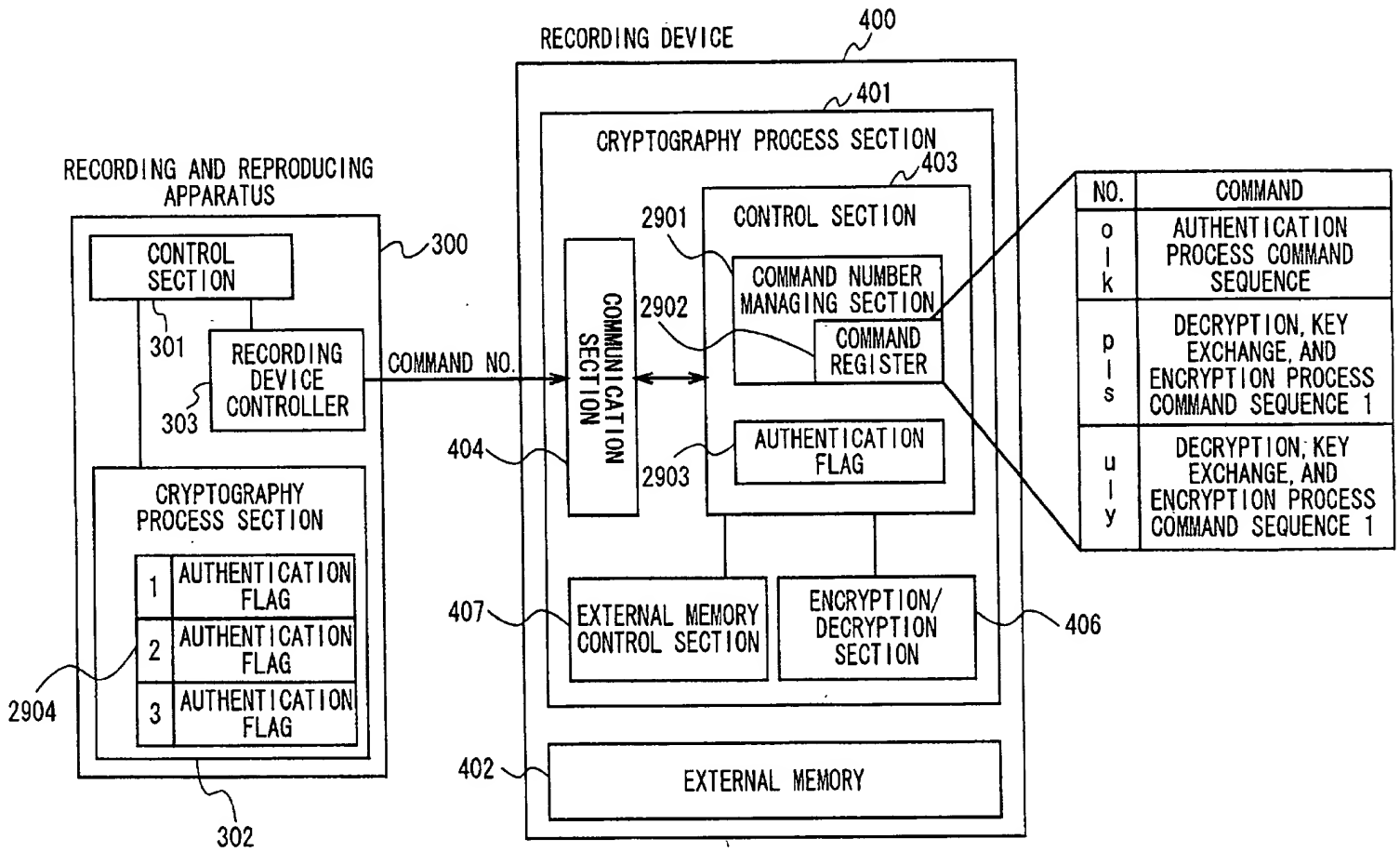

RECORDING AND REPRODUCING APPARATUS
CONTROL SECTION
300
301
RECORDING DEVICE CONTROLLER
303
COMMAND NO.
CRYPTOGRAPHY PROCESS SECTION
1 AUTHENTICATION FLAG
2 AUTHENTICATION FLAG
3 AUTHENTICATION FLAG
2904
302
RECORDING DEVICE
400
401
CRYPTOGRAPHY PROCESS SECTION
403
2901
CONTROL SECTION
COMMAND NUMBER MANAGING SECTION
2902
COMMAND REGISTER
COMMUNICATION SECTION
404
2903
AUTHENTICATION FLAG
407
EXTERNAL MEMORY CONTROL SECTION
ENCRYPTION/ DECRYPTION SECTION
406
402
EXTERNAL MEMORY
NO.
COMMAND
o i k
AUTHENTICATION PROCESS COMMAND SEQUENCE
p i s
DECRYPTION, KEY EXCHANGE, AND ENCRYPTION PROCESS COMMAND SEQUENCE 1
u i y
DECRYPTION, KEY EXCHANGE, AND ENCRYPTION PROCESS COMMAND SEQUENCE 1

FIG. 29

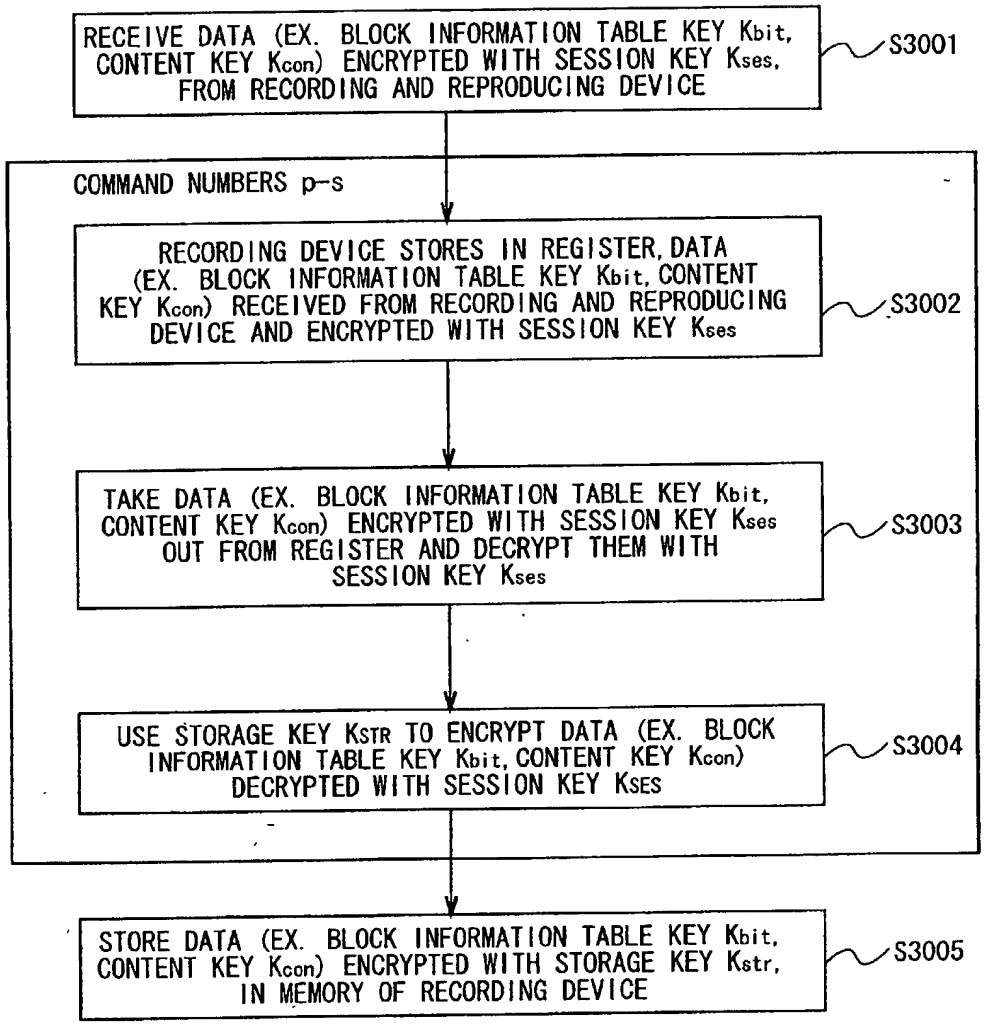

RECEIVE DATA (EX. BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon) ENCRYPTED WITH SESSION KEY Kses, FROM RECORDING AND REPRODUCING DEVICE
S3001
COMMAND NUMBERS p-s
RECORDING DEVICE STORES IN REGISTER, DATA (EX. BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon) RECEIVED FROM RECORDING AND REPRODUCING DEVICE AND ENCRYPTED WITH SESSION KEY Kses
S3002
TAKE DATA (EX. BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon) ENCRYPTED WITH SESSION KEY Kses OUT FROM REGISTER AND DECRYPT THEM WITH SESSION KEY Kses
S3003
USE STORAGE KEY KSTR TO ENCRYPT DATA (EX. BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon) DECRYPTED WITH SESSION KEY KSES
S3004
STORE DATA (EX. BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon) ENCRYPTED WITH STORAGE KEY Kstr, IN MEMORY OF RECORDING DEVICE
S3005

FIG. 30

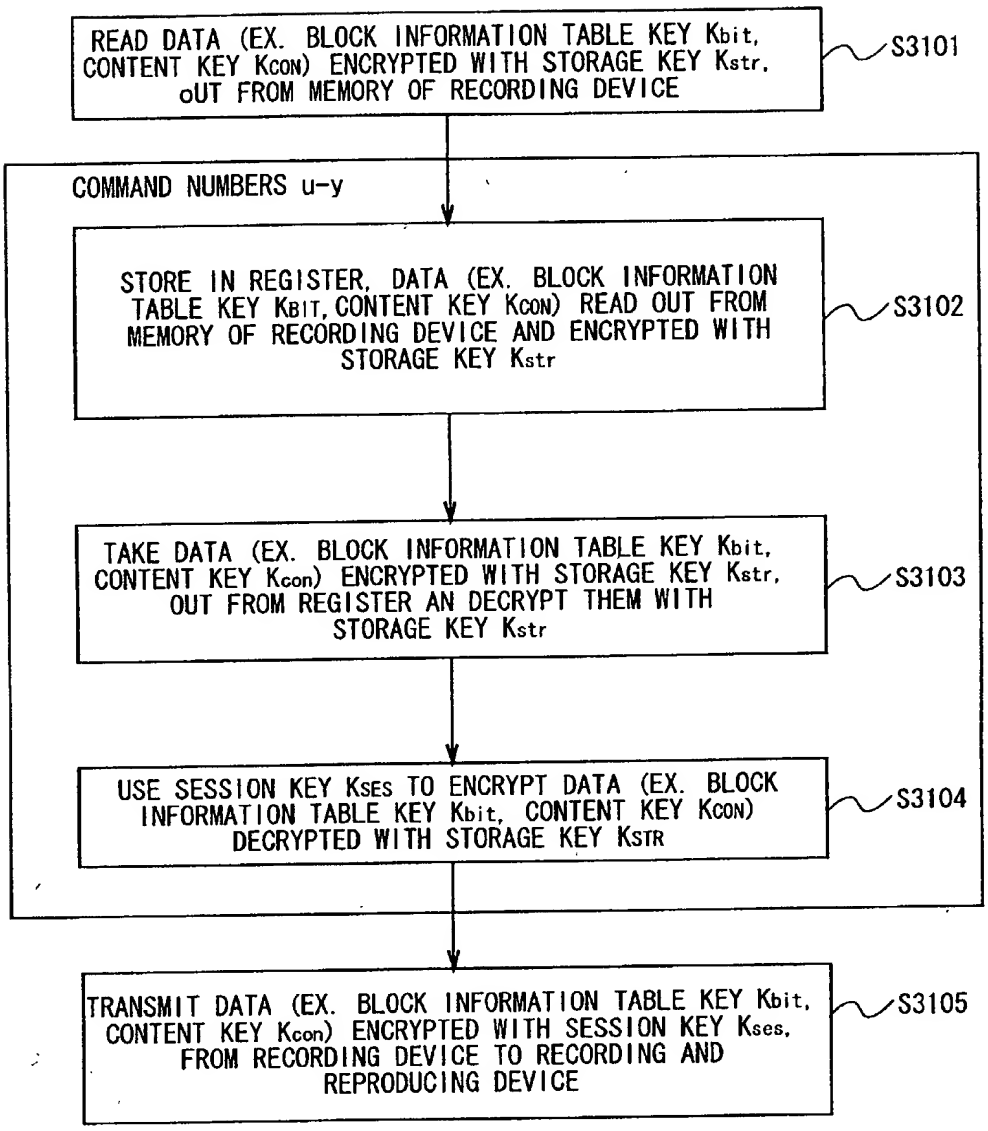

READ DATA (EX. BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon) ENCRYPTED WITH STORAGE KEY Kstr, oUT FROM MEMORY OF RECORDING DEVICE
S3101
COMMAND NUMBERS u-y
STORE IN REGISTER, DATA (EX. BLOCK INFORMATION TABLE KEY KBIT, CONTENT KEY KCON) READ OUT FROM MEMORY OF RECORDING DEVICE AND ENCRYPTED WITH STORAGE KEY Kstr
S3102
TAKE DATA (EX. BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon) ENCRYPTED WITH STORAGE KEY Kstr, OUT FROM REGISTER AN DECRYPT THEM WITH STORAGE KEY Kstr
S3103
USE SESSION KEY KSES TO ENCRYPT DATA (EX. BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY KCON) DECRYPTED WITH STORAGE KEY KSTR
S3104
TRANSMIT DATA (EX. BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon) ENCRYPTED WITH SESSION KEY Kses, FROM RECORDING DEVICE TO RECORDING AND REPRODUCING DEVICE
S3105

FIG. 31

FORMAT TYPE 0

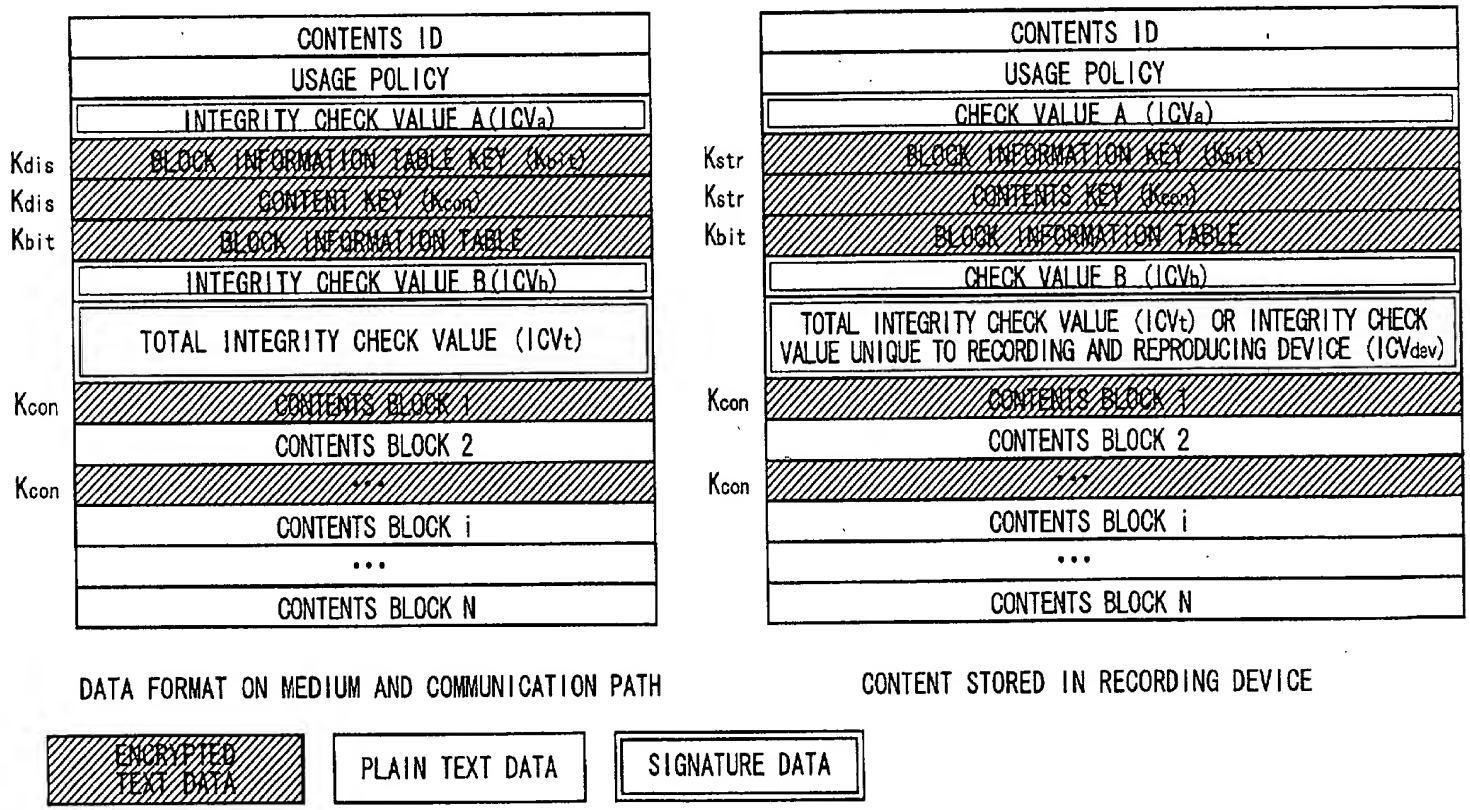


FIG. 32

FORMAT TYPE 1

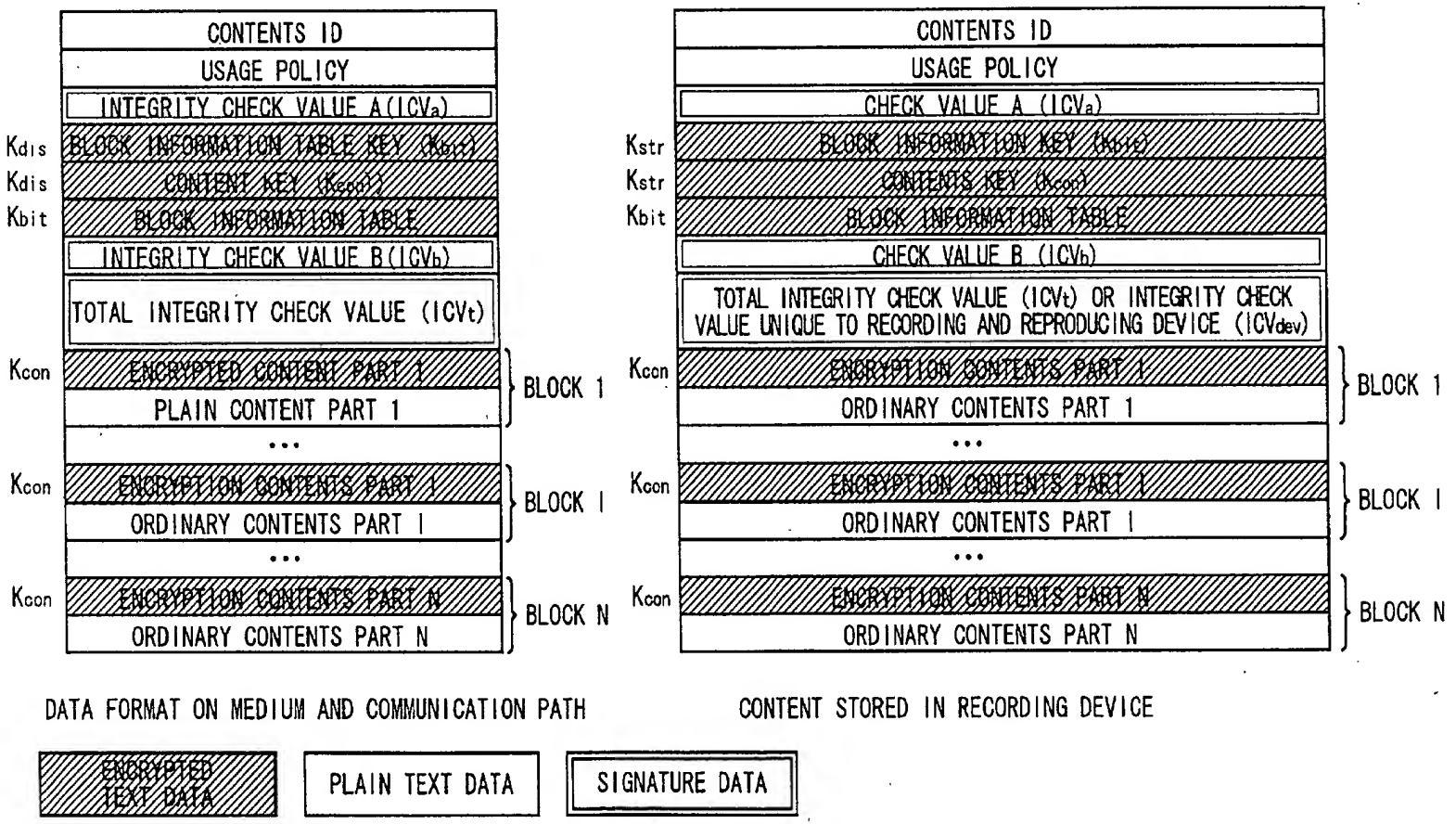


FIG. 33

FORMAT TYPE 2

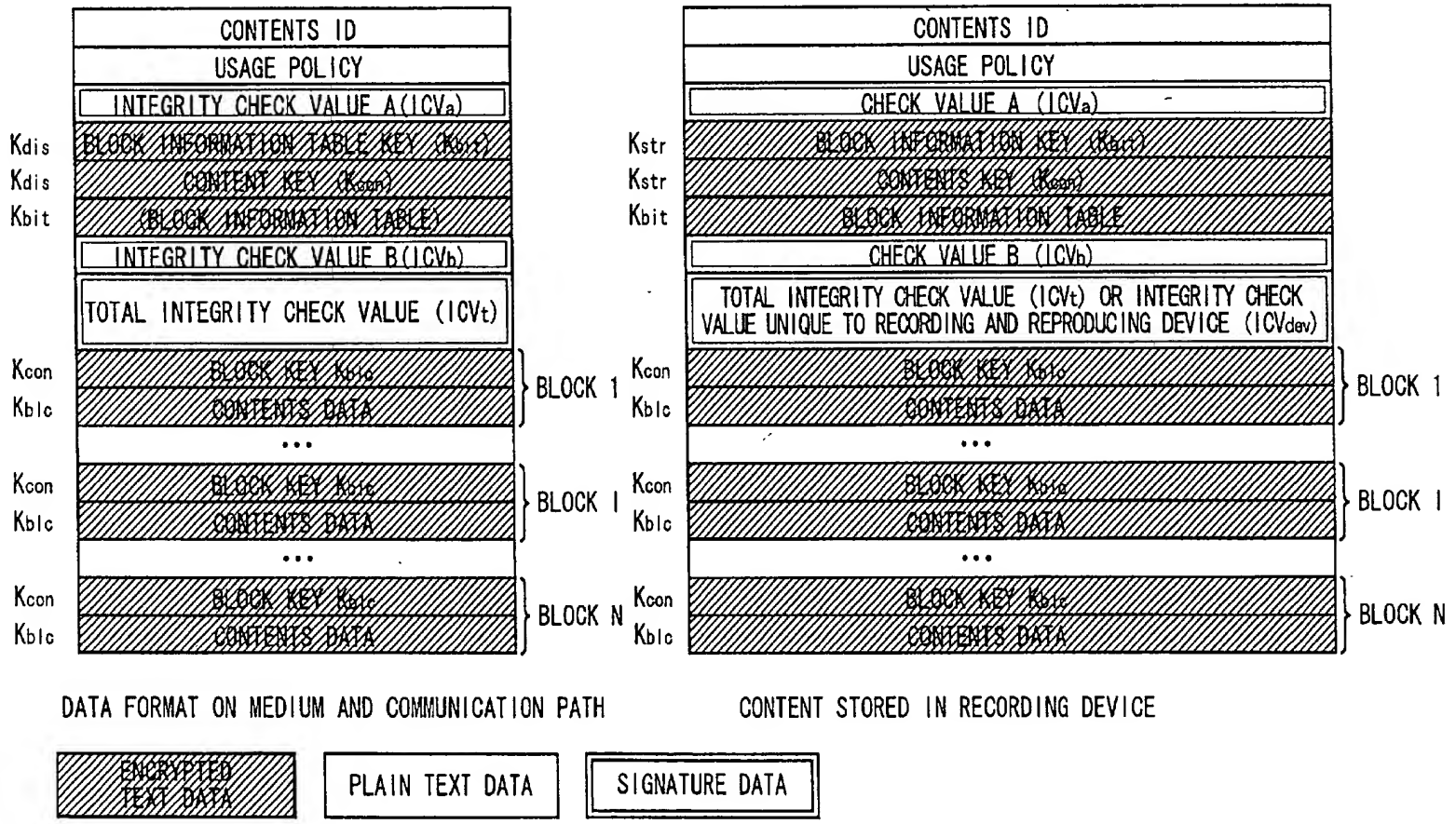


FIG. 34

FORMAT TYPE 3

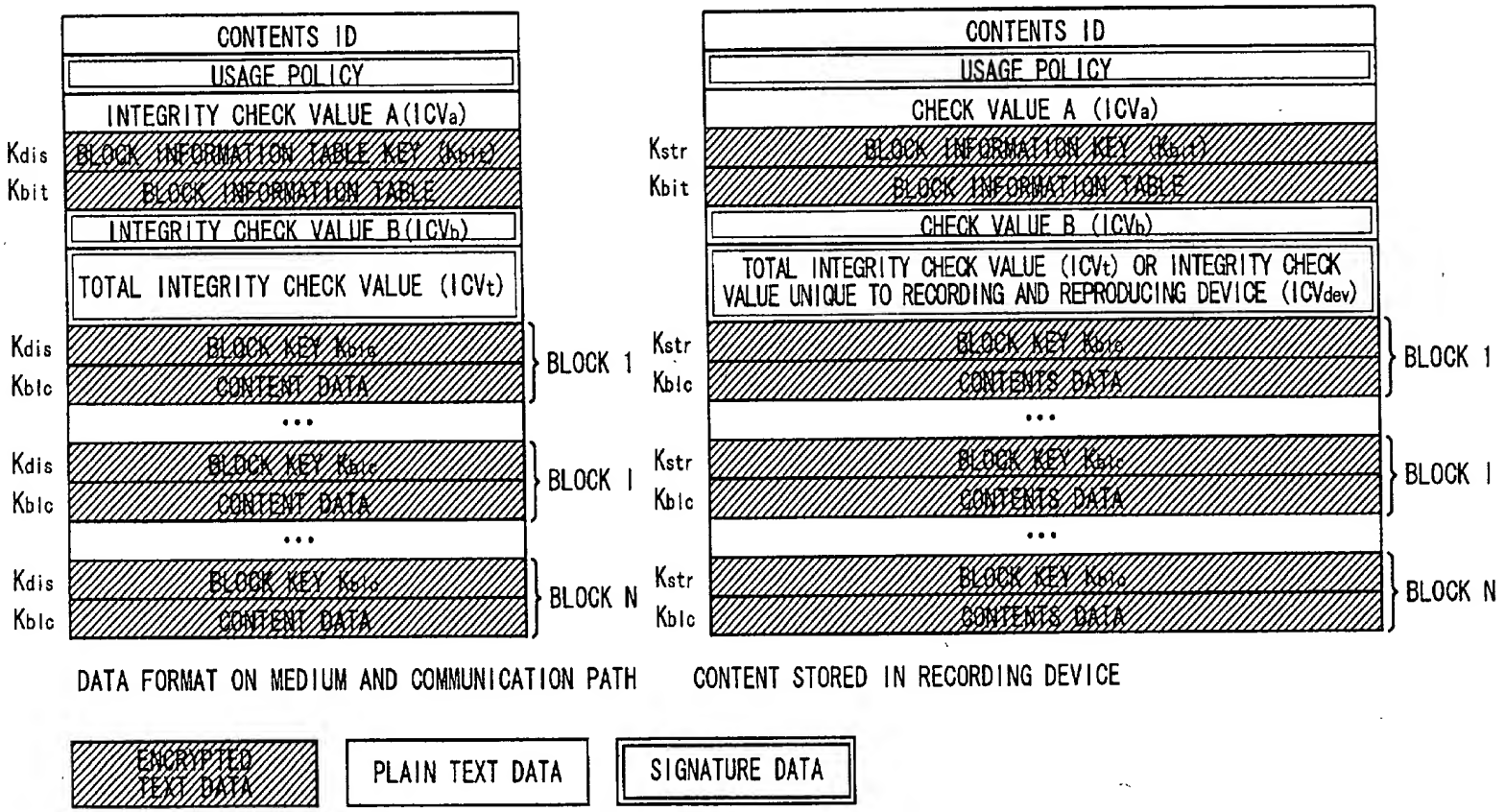
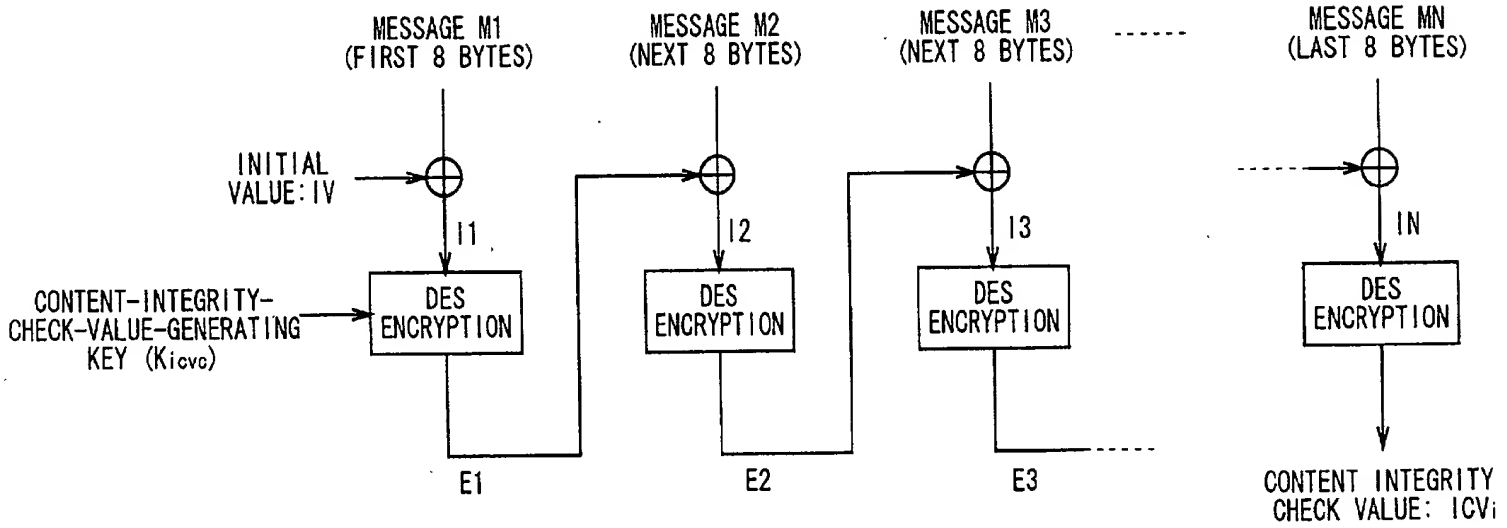


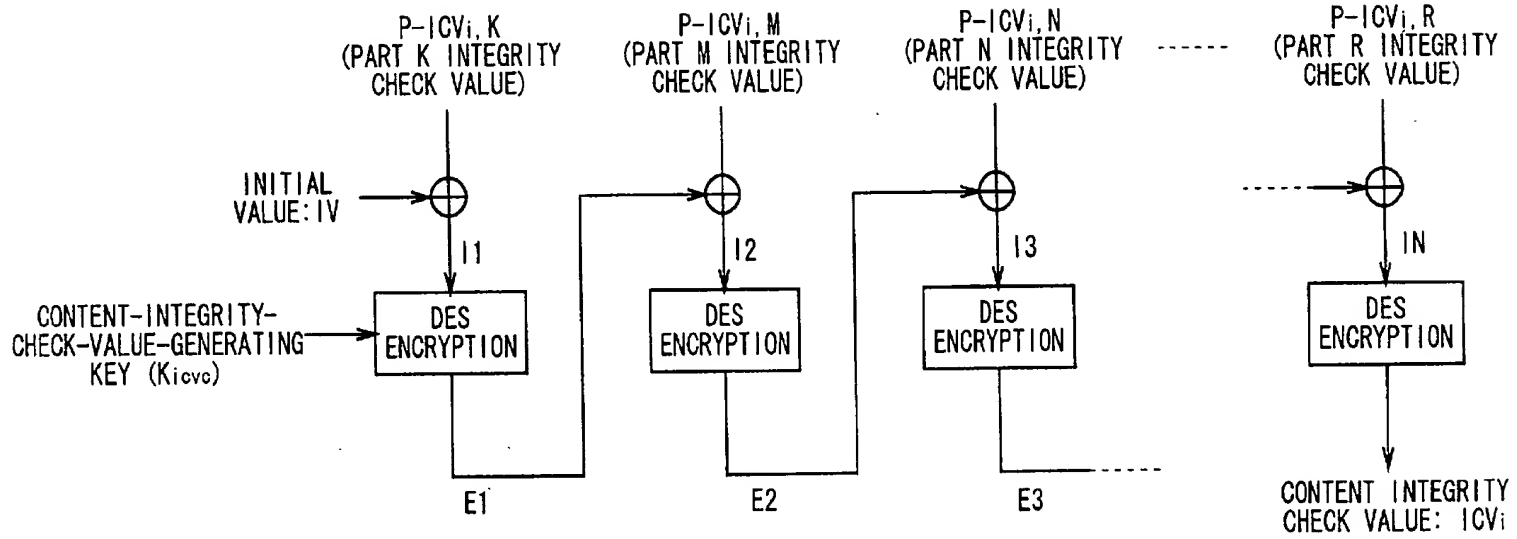
FIG. 35



MESSAGES M1 TO MN: CONTENT DATA IN CONTENT i

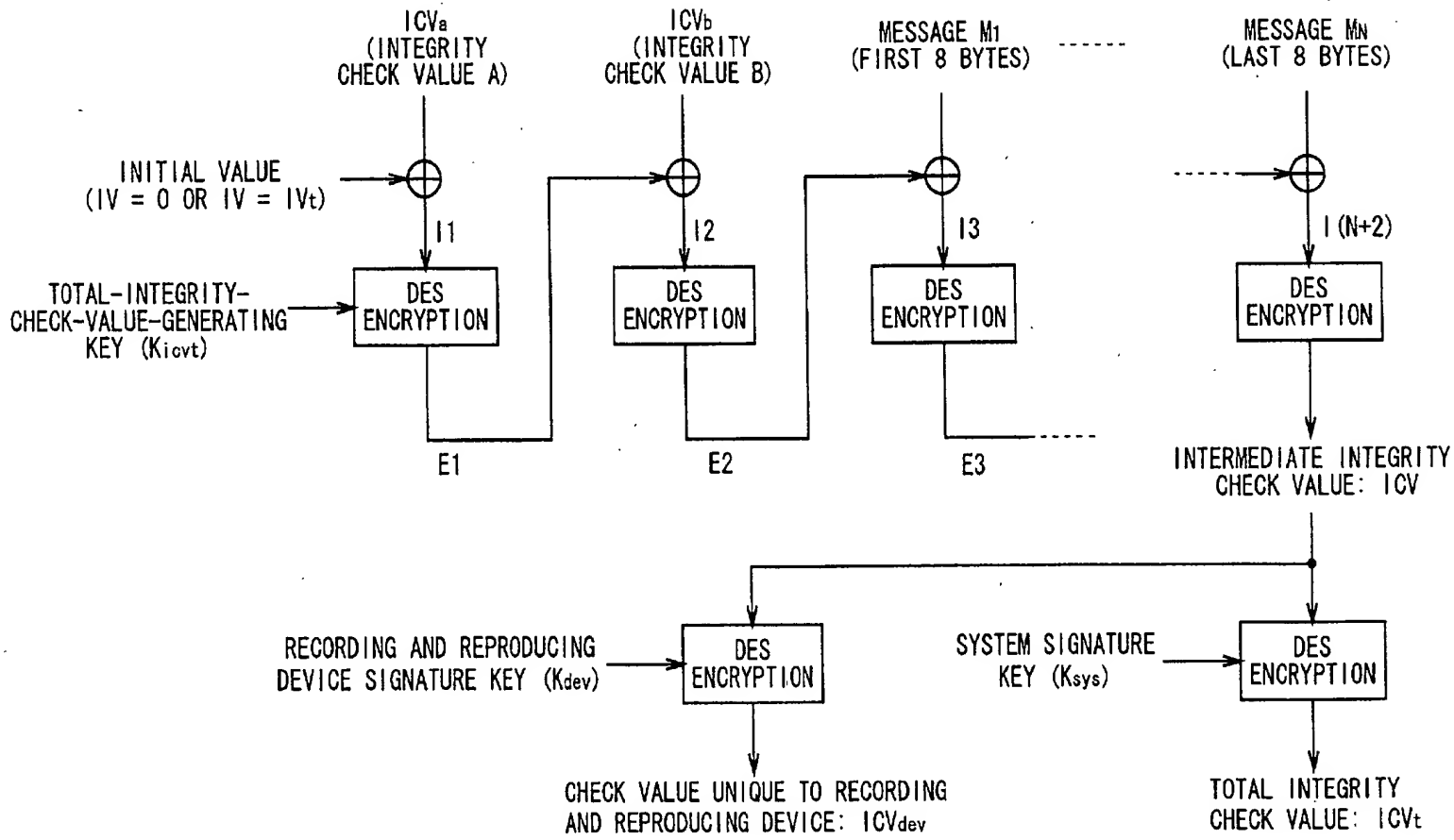
⊕:EXCLUSIVE OR PROCESS (EVERY 8 BYTES)

FIG. 36



⊕:EXCLUSIVE OR PROCESS (EVERY 8 BYTES)

FIG. 37



MESSAGES M1 TO MN: DATA IN CONTENT BLOCKS 1 TO N

⊕:EXCLUSIVE OR PROCESS (EVERY 8 BYTES)

FIG. 38

FORMAT TYPE 0 AND 1 DOWNLOAD PROCESS

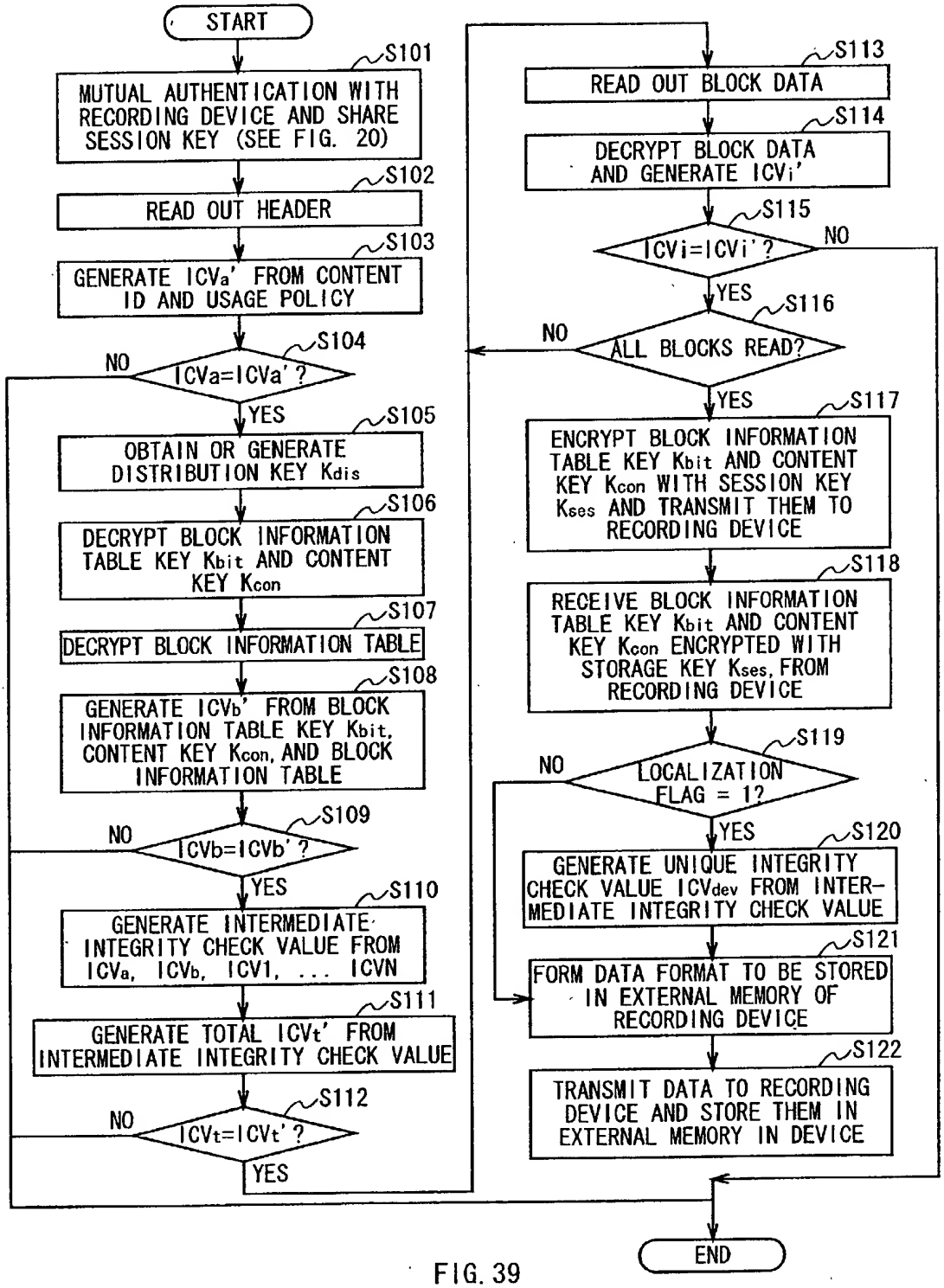


FIG. 39

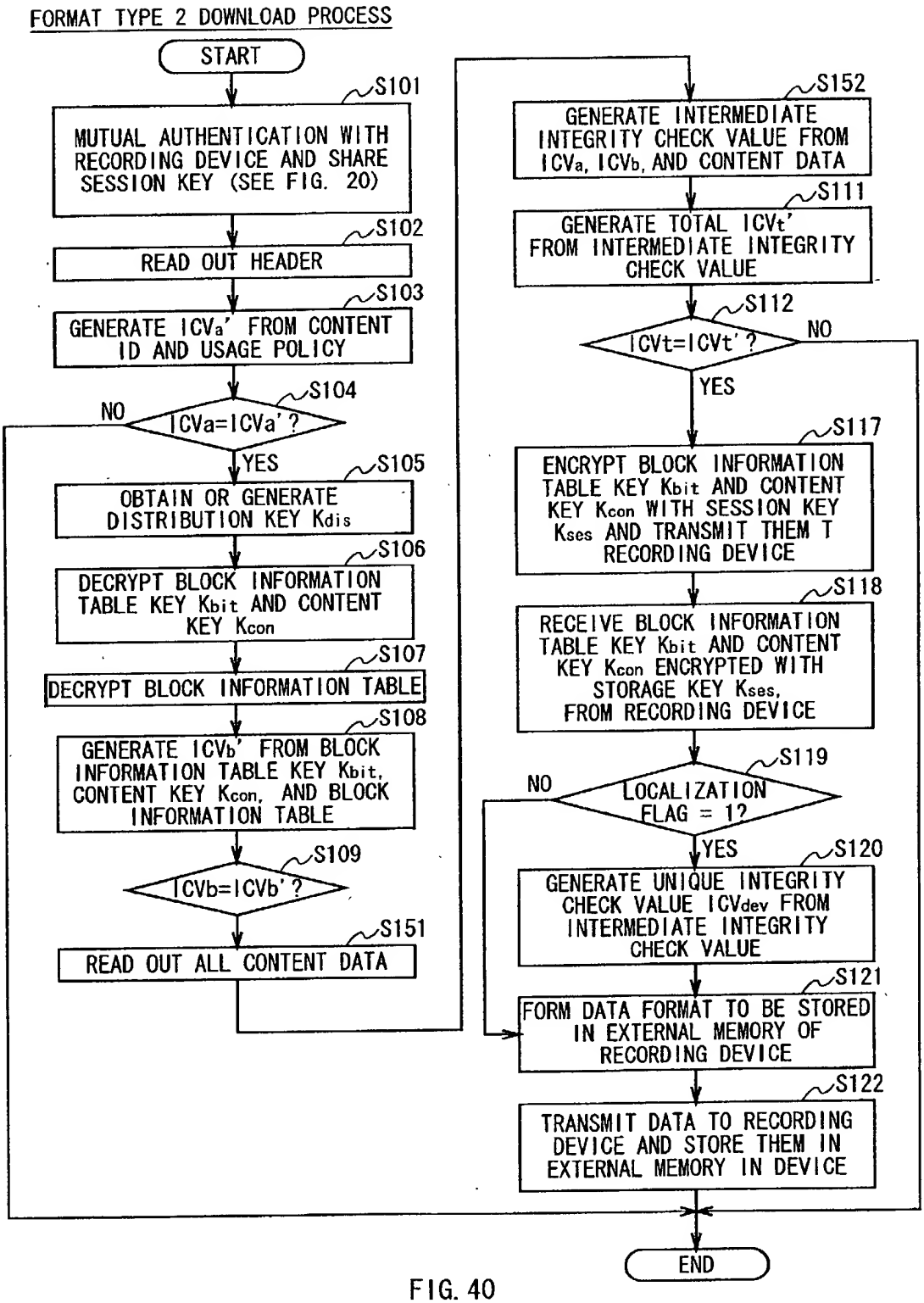

FORMAT TYPE 2 DOWNLOAD PROCESS
START
S101
MUTUAL AUTHENTICATION WITH RECORDING DEVICE AND SHARE SESSION KEY (SEE FIG. 20)
S102
READ OUT HEADER
S103
GENERATE ICVa' FROM CONTENT ID AND USAGE POLICY
S104
NO
ICVa=ICVa'?
YES
S105
OBTAIN OR GENERATE DISTRIBUTION KEY Kdis
S106
DECRYPT BLOCK INFORMATION TABLE KEY Kbit AND CONTENT KEY Kcon
S107
DECRYPT BLOCK INFORMATION TABLE
S108
GENERATE ICVb' FROM BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon, AND BLOCK INFORMATION TABLE
S109
ICVb=ICVb'?
S151
READ OUT ALL CONTENT DATA
S152
GENERATE INTERMEDIATE INTEGRITY CHECK VALUE FROM ICVa, ICVb, AND CONTENT DATA
S111
GENERATE TOTAL ICVt' FROM INTERMEDIATE INTEGRITY CHECK VALUE
S112
ICVt=ICVt'?
NO
YES
S117
ENCRYPT BLOCK INFORMATION TABLE KEY Kbit AND CONTENT KEY Kcon WITH SESSION KEY Kses AND TRANSMIT THEM T RECORDING DEVICE
S118
RECEIVE BLOCK INFORMATION TABLE KEY Kbit AND CONTENT KEY Kcon ENCRYPTED WITH STORAGE KEY Kses, FROM RECORDING DEVICE
S119
NO
LOCALIZATION FLAG = 1?
YES
S120
GENERATE UNIQUE INTEGRITY CHECK VALUE ICVdev FROM INTERMEDIATE INTEGRITY CHECK VALUE
S121
FORM DATA FORMAT TO BE STORED IN EXTERNAL MEMORY OF RECORDING DEVICE
S122
TRANSMIT DATA TO RECORDING DEVICE AND STORE THEM IN EXTERNAL MEMORY IN DEVICE
END

FIG. 40

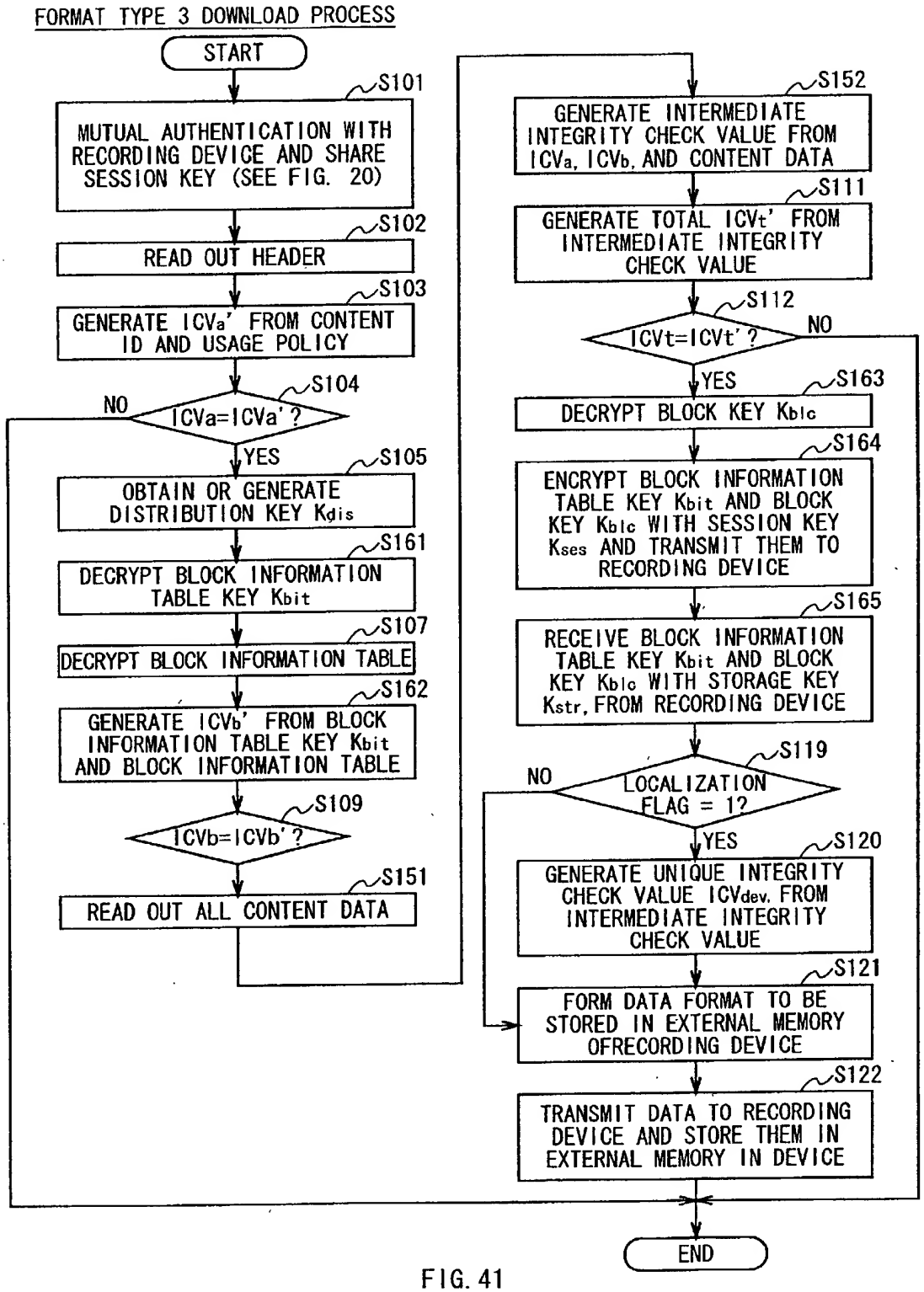

FORMAT TYPE 3 DOWNLOAD PROCESS
START
S101
MUTUAL AUTHENTICATION WITH RECORDING DEVICE AND SHARE SESSION KEY (SEE FIG. 20)
S102
READ OUT HEADER
S103
GENERATE ICVa' FROM CONTENT ID AND USAGE POLICY
S104
ICVa=ICVa'?
NO
YES
S105
OBTAIN OR GENERATE DISTRIBUTION KEY Kdis
S161
DECRYPT BLOCK INFORMATION TABLE KEY Kbit
S107
DECRYPT BLOCK INFORMATION TABLE
S162
GENERATE ICVb' FROM BLOCK INFORMATION TABLE KEY Kbit AND BLOCK INFORMATION TABLE
S109
ICVb=ICVb'?
S151
READ OUT ALL CONTENT DATA
S152
GENERATE INTERMEDIATE INTEGRITY CHECK VALUE FROM ICVa, ICVb, AND CONTENT DATA
S111
GENERATE TOTAL ICVt' FROM INTERMEDIATE INTEGRITY CHECK VALUE
S112
ICVt=ICVt'?
NO
YES
S163
DECRYPT BLOCK KEY Kblc
S164
ENCRYPT BLOCK INFORMATION TABLE KEY Kbit AND BLOCK KEY Kblc WITH SESSION KEY Kses AND TRANSMIT THEM TO RECORDING DEVICE
S165
RECEIVE BLOCK INFORMATION TABLE KEY Kbit AND BLOCK KEY Kblc WITH STORAGE KEY Kstr, FROM RECORDING DEVICE
S119
LOCALIZATION FLAG = 1?
NO
YES
S120
GENERATE UNIQUE INTEGRITY CHECK VALUE ICVdev, FROM INTERMEDIATE INTEGRITY CHECK VALUE
S121
FORM DATA FORMAT TO BE STORED IN EXTERNAL MEMORY OFRECORDING DEVICE
S122
TRANSMIT DATA TO RECORDING DEVICE AND STORE THEM IN EXTERNAL MEMORY IN DEVICE
END

FIG. 41

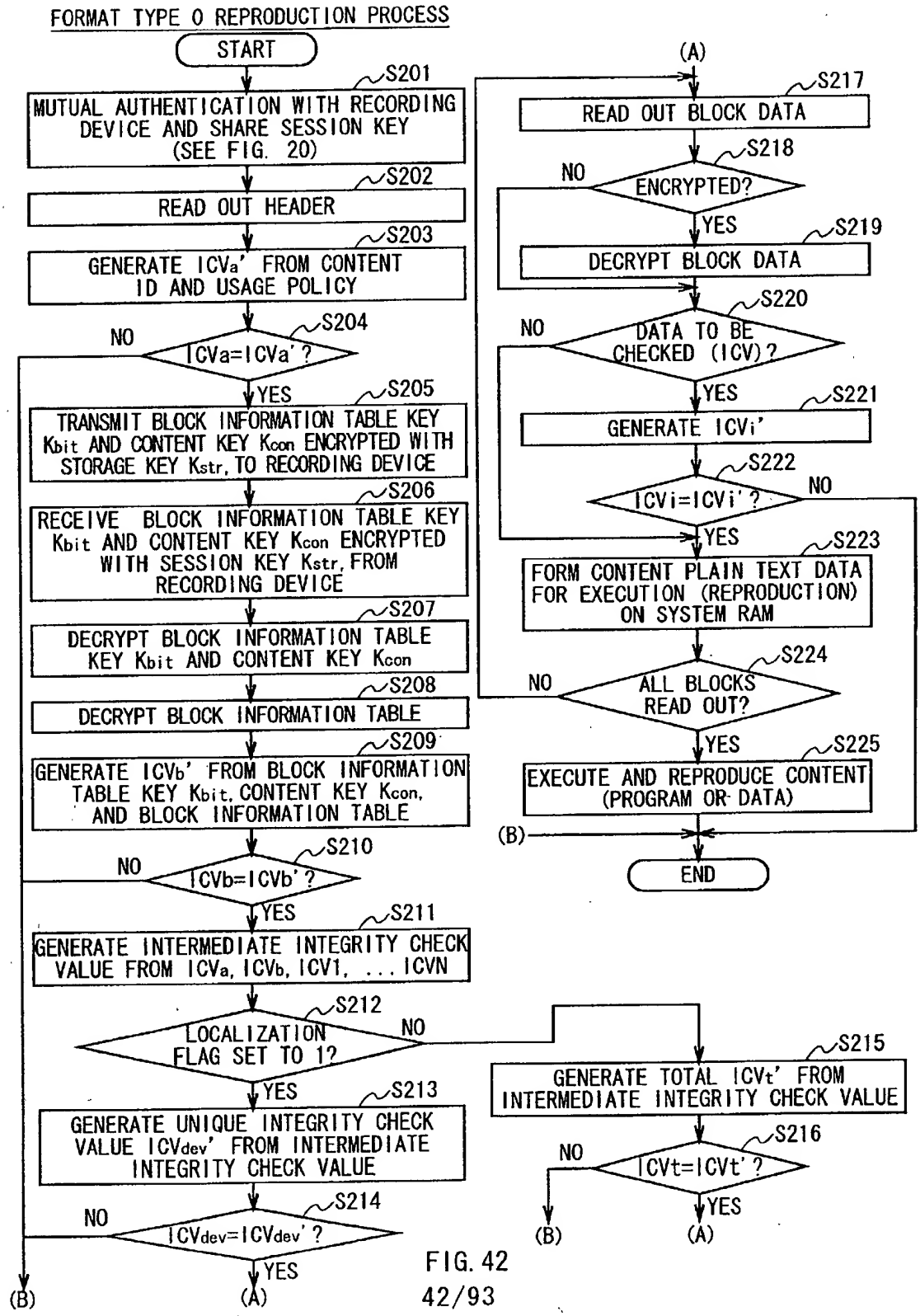


FIG. 42

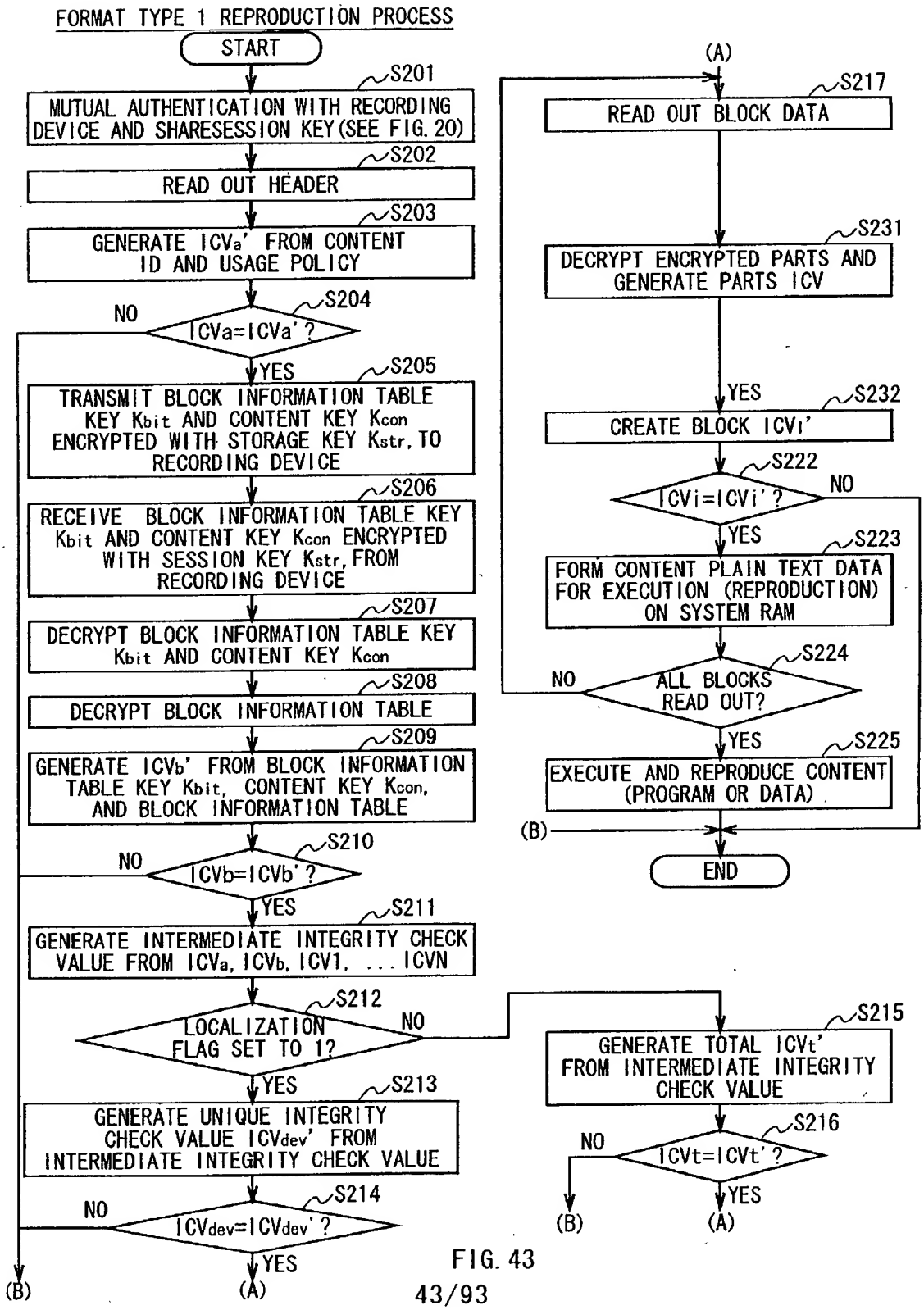

FORMAT TYPE 1 REPRODUCTION PROCESS
START
S201
MUTUAL AUTHENTICATION WITH RECORDING DEVICE AND SHARESESSION KEY(SEE FIG. 20)
S202
READ OUT HEADER
S203
GENERATE ICVa' FROM CONTENT ID AND USAGE POLICY
S204
ICVa=ICVa'?
NO
YES
S205
TRANSMIT BLOCK INFORMATION TABLE KEY Kbit AND CONTENT KEY Kcon ENCRYPTED WITH STORAGE KEY Kstr, TO RECORDING DEVICE
S206
RECEIVE BLOCK INFORMATION TABLE KEY Kbit AND CONTENT KEY Kcon ENCRYPTED WITH SESSION KEY Kstr, FROM RECORDING DEVICE
S207
DECRYPT BLOCK INFORMATION TABLE KEY Kbit AND CONTENT KEY Kcon
S208
DECRYPT BLOCK INFORMATION TABLE
S209
GENERATE ICVb' FROM BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon, AND BLOCK INFORMATION TABLE
S210
ICVb=ICVb'?
NO
YES
S211
GENERATE INTERMEDIATE INTEGRITY CHECK VALUE FROM ICVa, ICVb, ICV1, ... ICVN
S212
LOCALIZATION FLAG SET TO 1?
NO
YES
S213
GENERATE UNIQUE INTEGRITY CHECK VALUE ICVdev' FROM INTERMEDIATE INTEGRITY CHECK VALUE
S214
ICVdev=ICVdev'?
NO
YES
(B)
(A)
S215
GENERATE TOTAL ICVt' FROM INTERMEDIATE INTEGRITY CHECK VALUE
S216
ICVt=ICVt'?
NO
YES
(B)
(A)
(A)
S217
READ OUT BLOCK DATA
S231
DECRYPT ENCRYPTED PARTS AND GENERATE PARTS ICV
S232
CREATE BLOCK ICVi'
YES
S222
ICVi=ICVi'?
NO
YES
S223
FORM CONTENT PLAIN TEXT DATA FOR EXECUTION (REPRODUCTION) ON SYSTEM RAM
S224
ALL BLOCKS READ OUT?
NO
YES
S225
EXECUTE AND REPRODUCE CONTENT (PROGRAM OR DATA)
(B)
END

FIG. 43

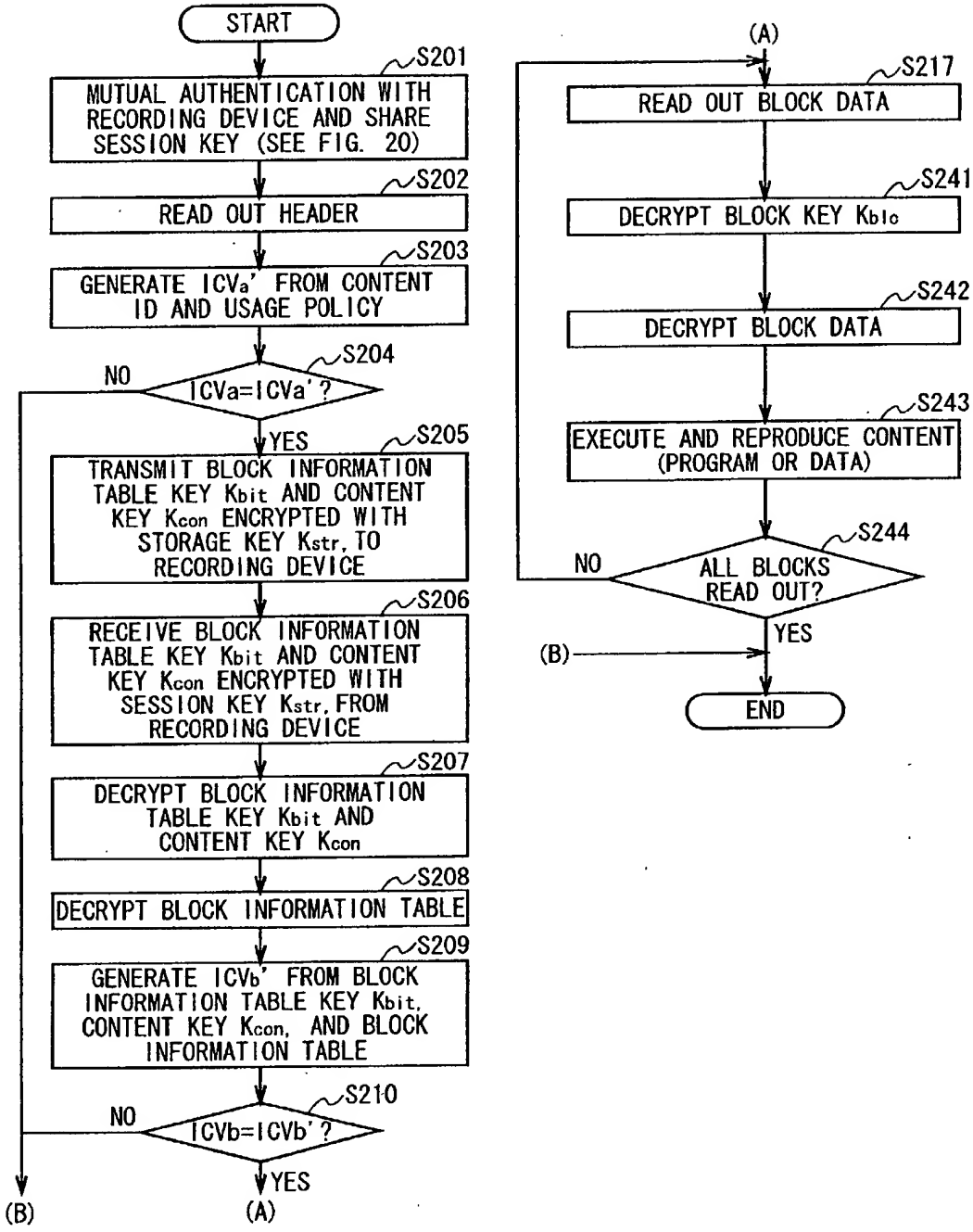

START
S201
MUTUAL AUTHENTICATION WITH RECORDING DEVICE AND SHARE SESSION KEY (SEE FIG. 20)
S202
READ OUT HEADER
S203
GENERATE ICVa' FROM CONTENT ID AND USAGE POLICY
S204
NO
ICVa=ICVa'?
YES
S205
TRANSMIT BLOCK INFORMATION TABLE KEY Kbit AND CONTENT KEY Kcon ENCRYPTED WITH STORAGE KEY Kstr, TO RECORDING DEVICE
S206
RECEIVE BLOCK INFORMATION TABLE KEY Kbit AND CONTENT KEY Kcon ENCRYPTED WITH SESSION KEY Kstr, FROM RECORDING DEVICE
S207
DECRYPT BLOCK INFORMATION TABLE KEY Kbit AND CONTENT KEY Kcon
S208
DECRYPT BLOCK INFORMATION TABLE
S209
GENERATE ICVb' FROM BLOCK INFORMATION TABLE KEY Kbit, CONTENT KEY Kcon, AND BLOCK INFORMATION TABLE
S210
NO
ICVb=ICVb'?
YES
(B)
(A)
(A)
S217
READ OUT BLOCK DATA
S241
DECRYPT BLOCK KEY Kblc
S242
DECRYPT BLOCK DATA
S243
EXECUTE AND REPRODUCE CONTENT (PROGRAM OR DATA)
S244
NO
ALL BLOCKS READ OUT?
YES
(B)
END

FIG. 44

FORMAT TYPE 3 REPRODUCTION PROCESS

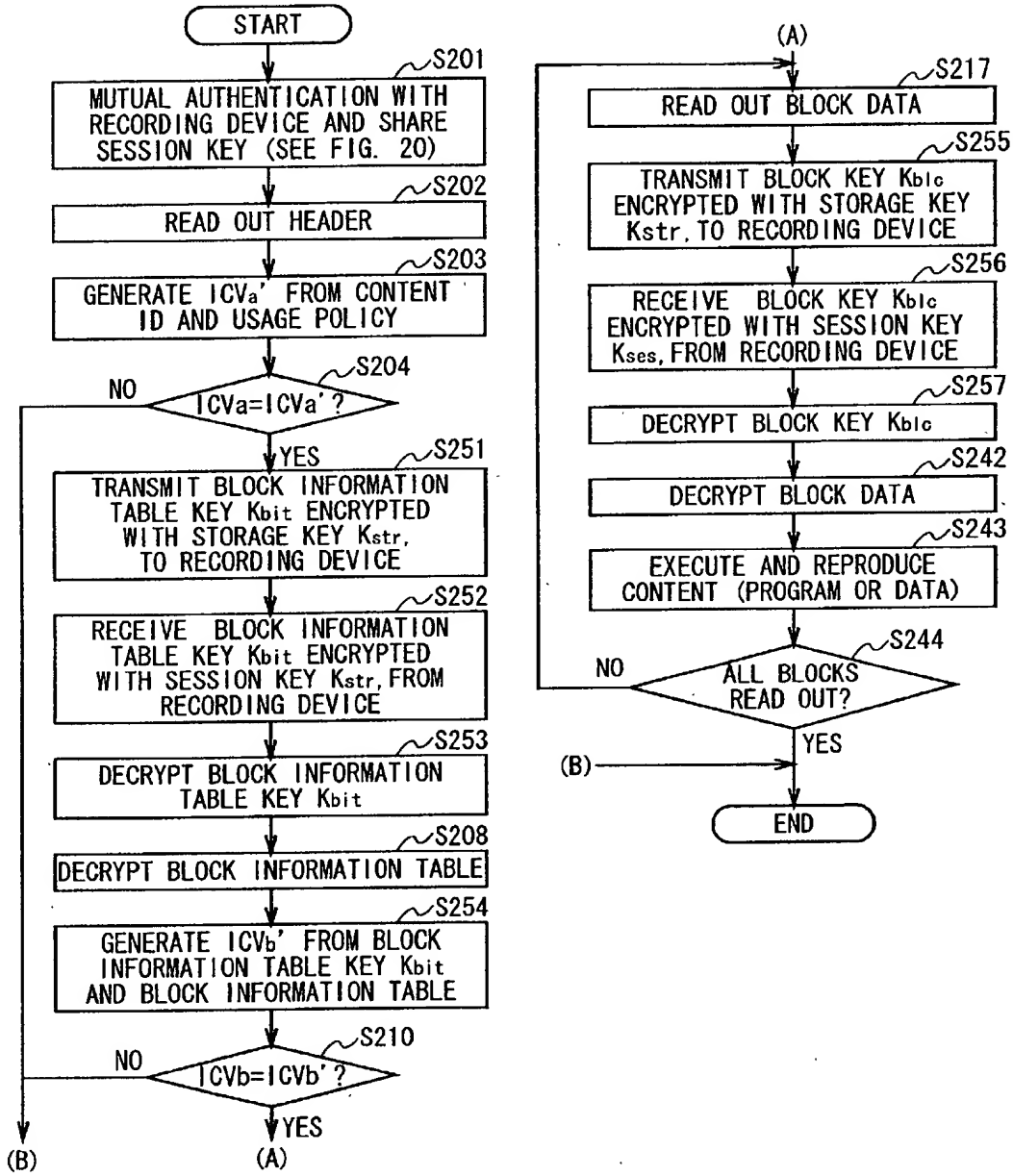


FIG. 45

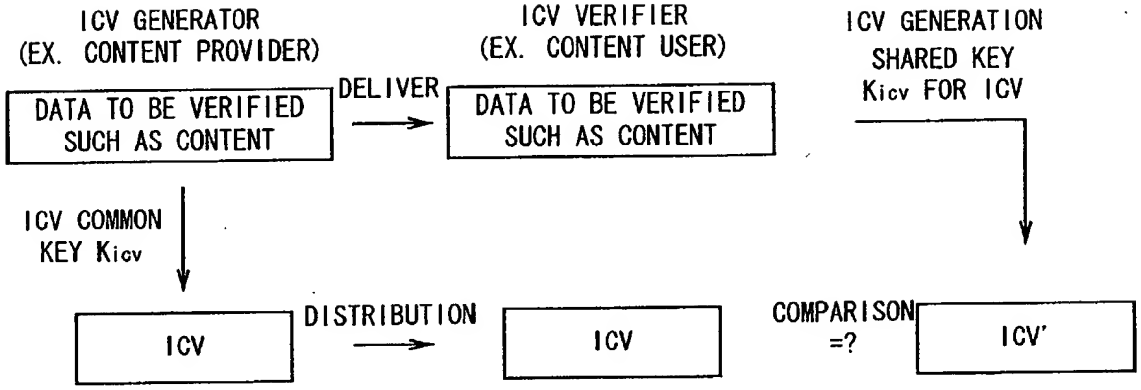

ICV GENERATOR
(EX. CONTENT PROVIDER)
ICV VERIFIER
(EX. CONTENT USER)
ICV GENERATION
SHARED KEY
Kicv FOR ICV
DATA TO BE VERIFIED
SUCH AS CONTENT
DELIVER
DATA TO BE VERIFIED
SUCH AS CONTENT
ICV COMMON
KEY Kicv
ICV
DISTRIBUTION
ICV
COMPARISON
=?
ICV'

FIG. 46

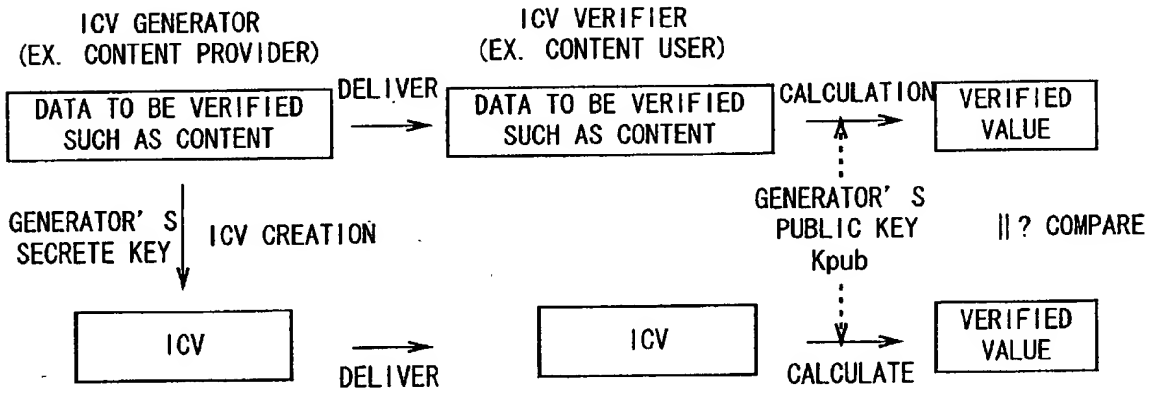

ICV GENERATOR
(EX. CONTENT PROVIDER)
ICV VERIFIER
(EX. CONTENT USER)
DATA TO BE VERIFIED
SUCH AS CONTENT
DELIVER
DATA TO BE VERIFIED
SUCH AS CONTENT
CALCULATION
VERIFIED
VALUE
GENERATOR' S
SECRETE KEY
ICV CREATION
GENERATOR' S
PUBLIC KEY
Kpub
|| ? COMPARE
ICV
DELIVER
ICV
CALCULATE
VERIFIED
VALUE

FIG. 47

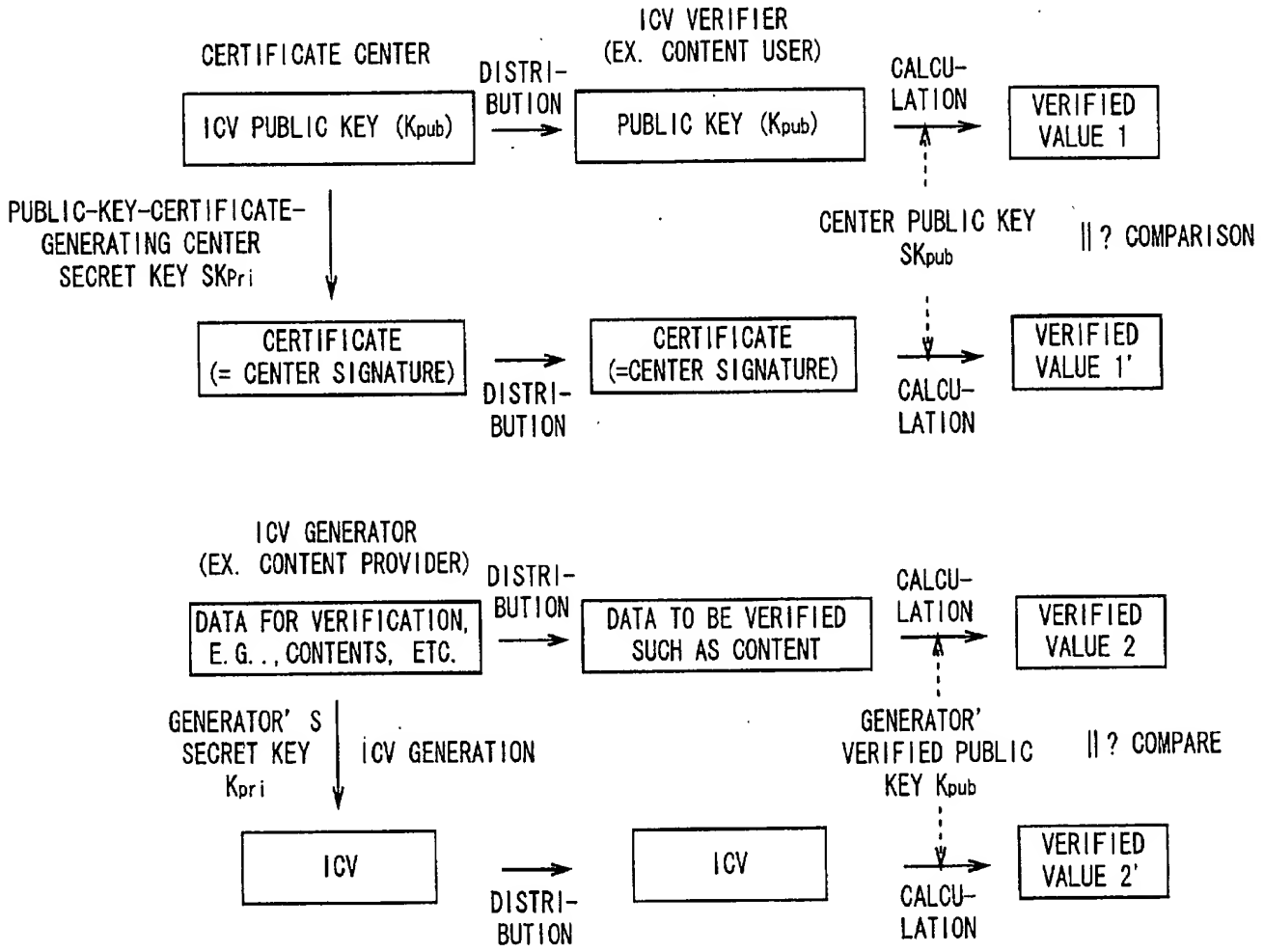
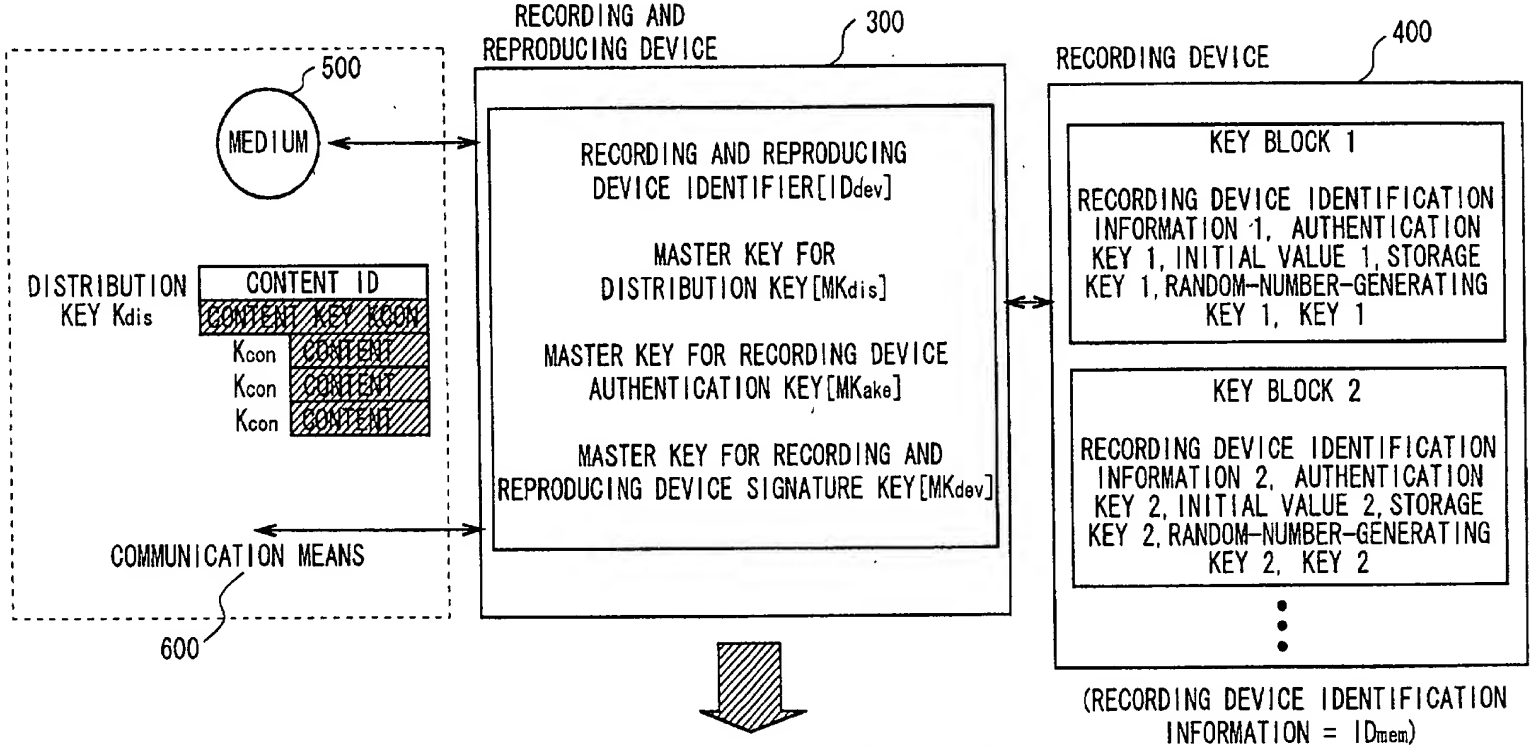

CERTIFICATE CENTER
ICV VERIFIER
(EX. CONTENT USER)
ICV PUBLIC KEY (Kpub)
DISTRI-
BUTION
PUBLIC KEY (Kpub)
CALCU-
LATION
VERIFIED
VALUE 1
PUBLIC-KEY-CERTIFICATE-
GENERATING CENTER
SECRET KEY SKPri
CENTER PUBLIC KEY
SKpub
|| ? COMPARISON
CERTIFICATE
(= CENTER SIGNATURE)
DISTRI-
BUTION
CERTIFICATE
(=CENTER SIGNATURE)
CALCU-
LATION
VERIFIED
VALUE 1'
ICV GENERATOR
(EX. CONTENT PROVIDER)
DISTRI-
BUTION
DATA FOR VERIFICATION,
E.G.., CONTENTS, ETC.
DATA TO BE VERIFIED
SUCH AS CONTENT
CALCU-
LATION
VERIFIED
VALUE 2
GENERATOR' S
SECRET KEY
Kpri
ICV GENERATION
GENERATOR'
VERIFIED PUBLIC
KEY Kpub
|| ? COMPARE
ICV
DISTRI-
BUTION
ICV
CALCU-
LATION
VERIFIED
VALUE 2'

FIG. 48



DISTRIBUTION KEY : K_{DIS} = DES (MKdis, CONTENT ID)

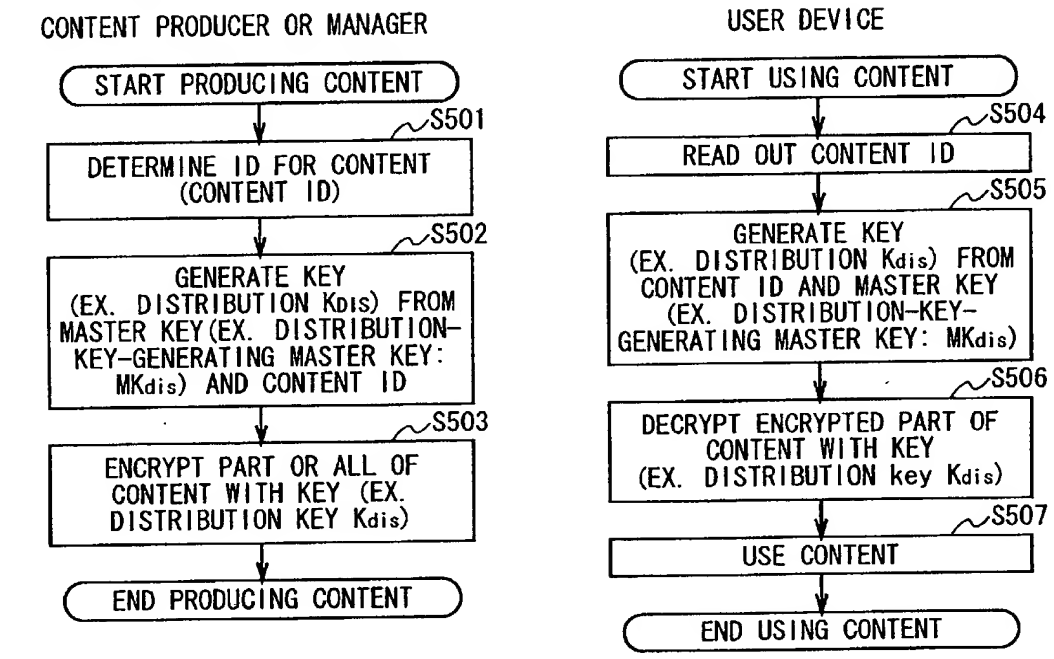
AUTHENTICATION KEY : K_{ake} = DES (MKake, ID_{mem})

RECORDING AND REPRODUCING DEVICE SIGNATURE KEY : K_{dev} = DES (MKdev, ID_{dev})

FIG. 49

METHOD FOR GENERATING INDIVIDUAL KEY FROM MASTER KEY -(1)

[BASIC FLOW]



[KEY OWNER CONFIGURATION]

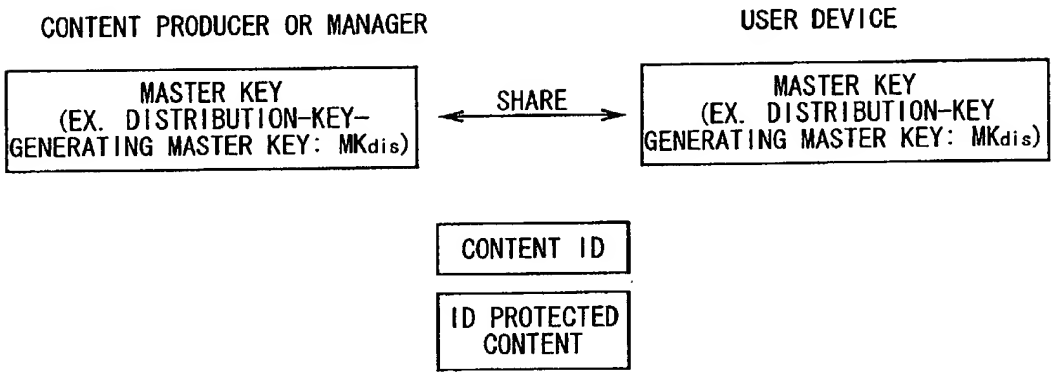


FIG. 50

METHOD FOR GENERATING INDIVIDUAL KEY FROM MASTER KEY - (2)

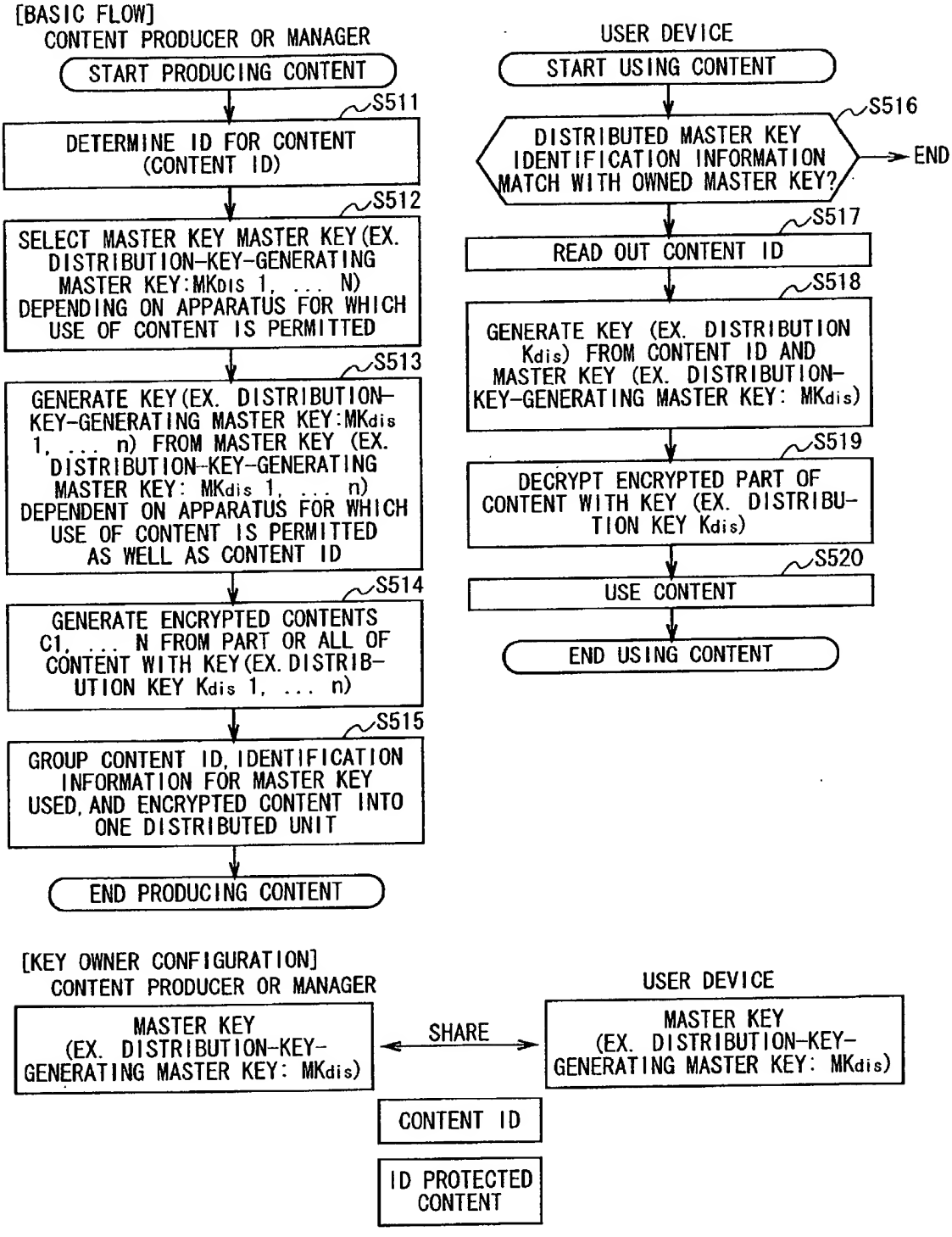


FIG. 51

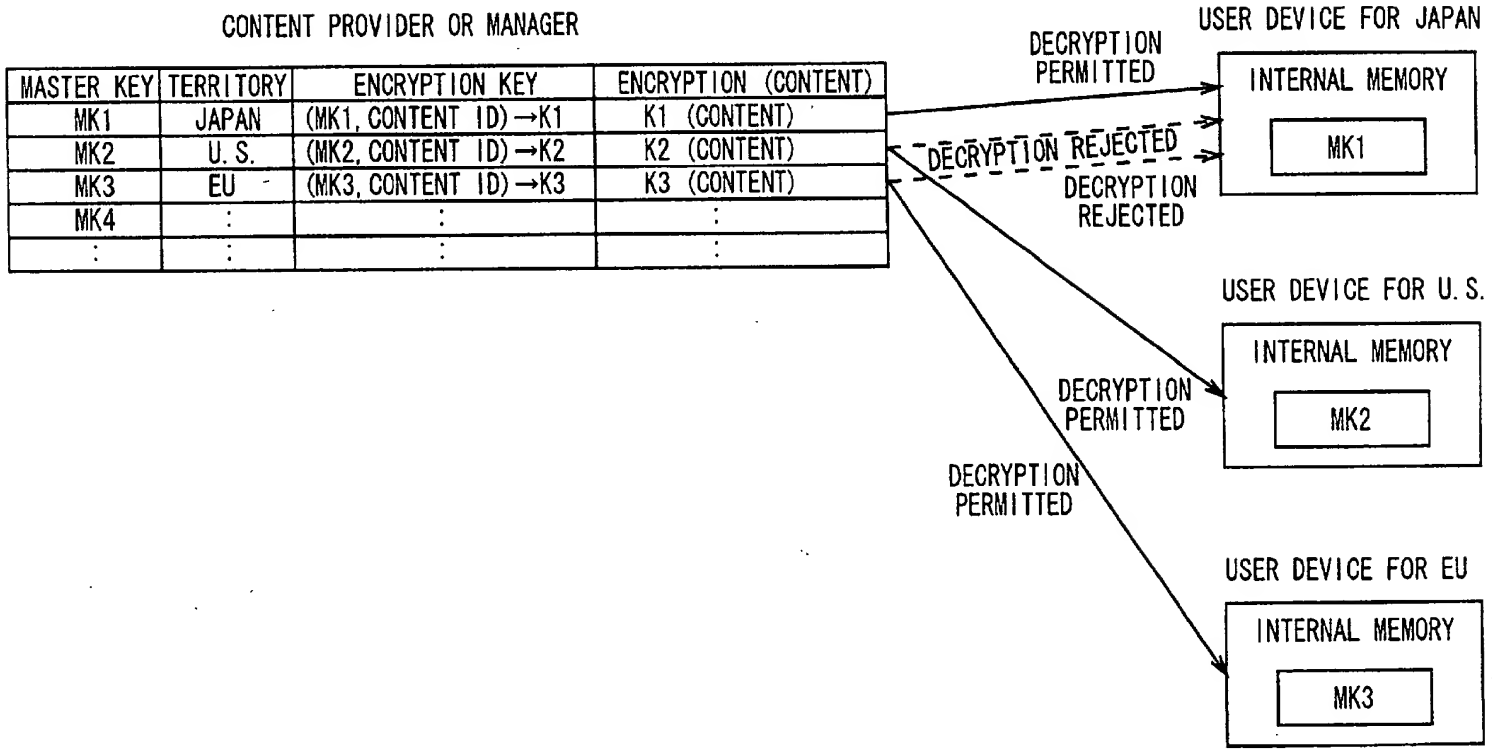
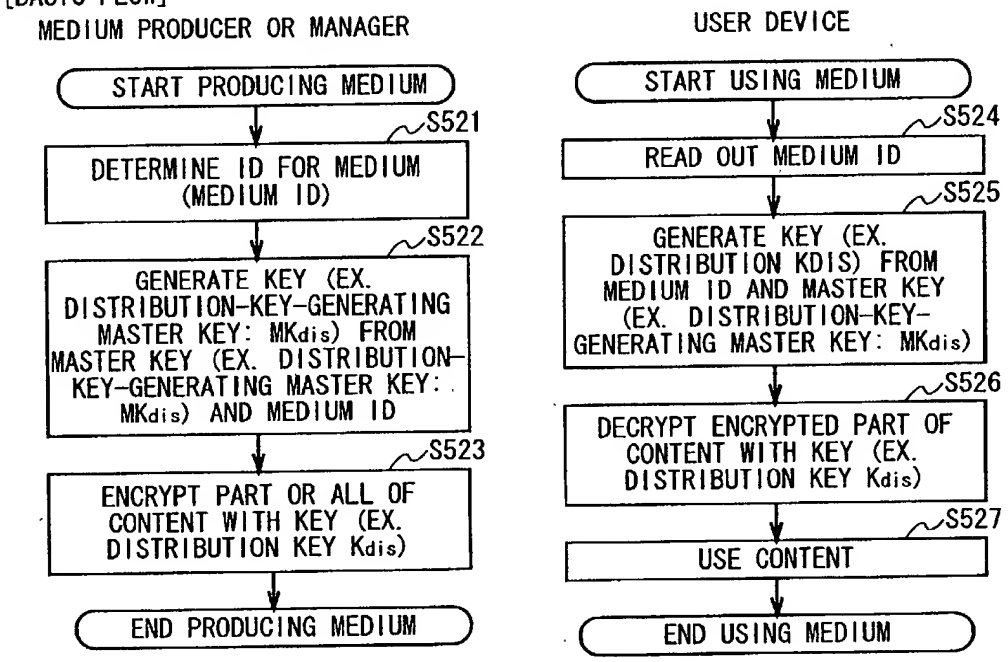

CONTENT PROVIDER OR MANAGER
MASTER KEY
TERRITORY
ENCRYPTION KEY
ENCRYPTION (CONTENT)
MK1
JAPAN
(MK1, CONTENT ID)→K1
K1 (CONTENT)
MK2
U. S.
(MK2, CONTENT ID)→K2
K2 (CONTENT)
MK3
EU
(MK3, CONTENT ID)→K3
K3 (CONTENT)
MK4
USER DEVICE FOR JAPAN
DECRYPTION PERMITTED
INTERNAL MEMORY
MK1
DECRYPTION REJECTED
DECRYPTION REJECTED
USER DEVICE FOR U. S.
INTERNAL MEMORY
MK2
DECRYPTION PERMITTED
DECRYPTION PERMITTED
USER DEVICE FOR EU
INTERNAL MEMORY
MK3

FIG. 52

METHOD FOR GENERATING INDIVIDUAL KEY FROM MASTER KEY -(3)

[BASIC FLOW]



[KEY OWNER CONFIGURATION]

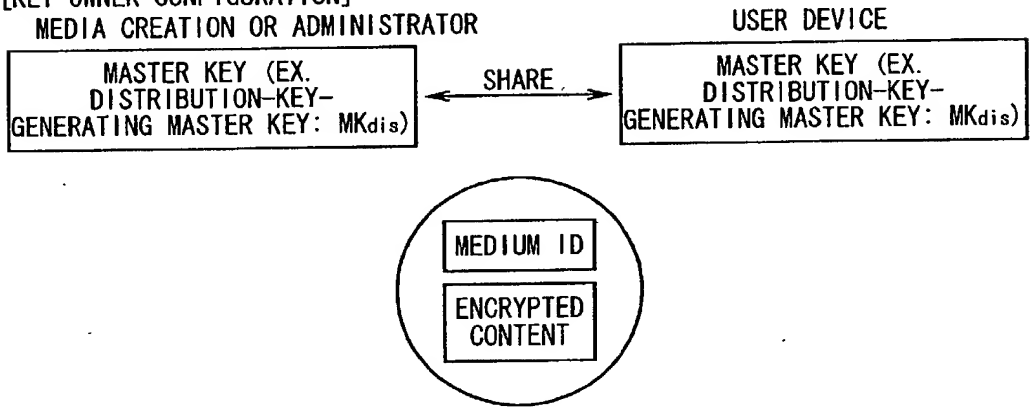
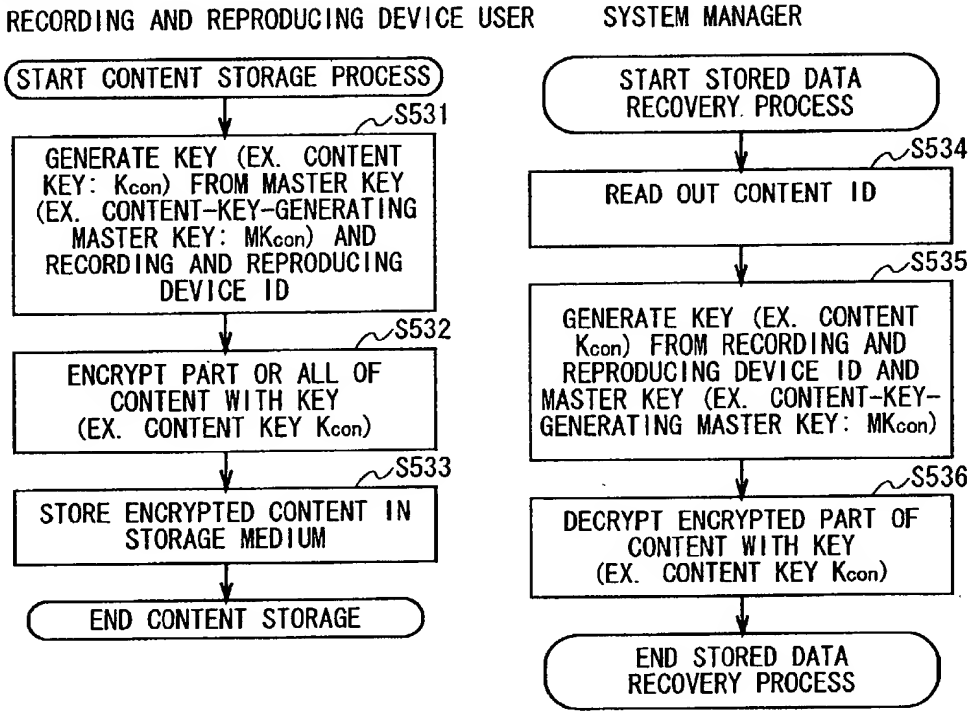


FIG. 53

METHOD FOR GENERATING INDIVIDUAL KEY FROM MASTER KEY -(4)

[BASIC FLOW]



[KEY OWNER CONFIGURATION]

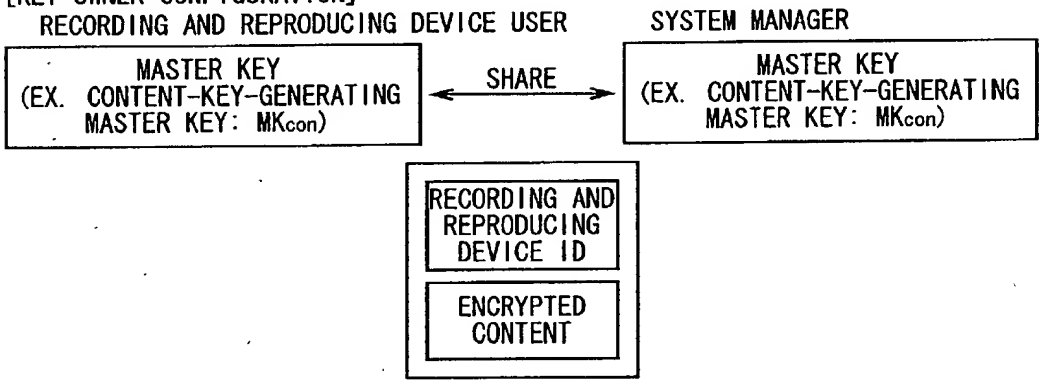
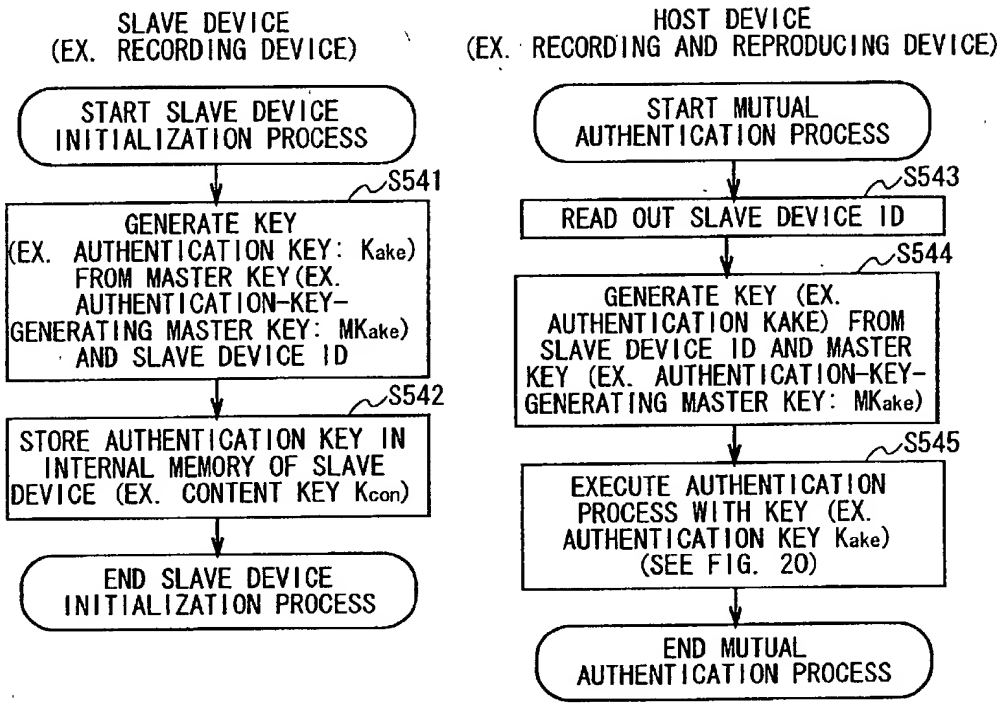


FIG. 54

METHOD FOR GENERATING INDIVIDUAL KEY FROM MASTER KEY - (5)

[BASIC FLOW]



[KEY OWNER CONFIGURATION]

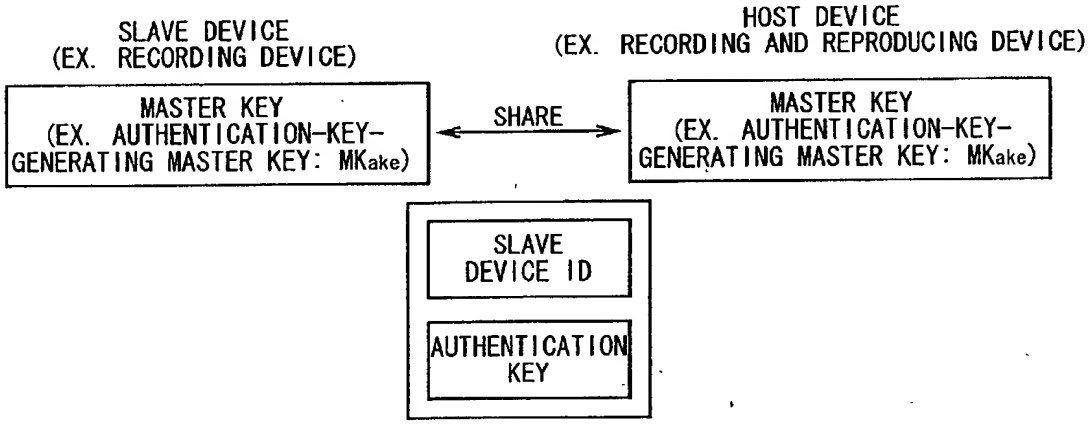


FIG. 55

METHOD FOR GENERATING INDIVIDUAL KEY FROM MASTER KEY -(5)

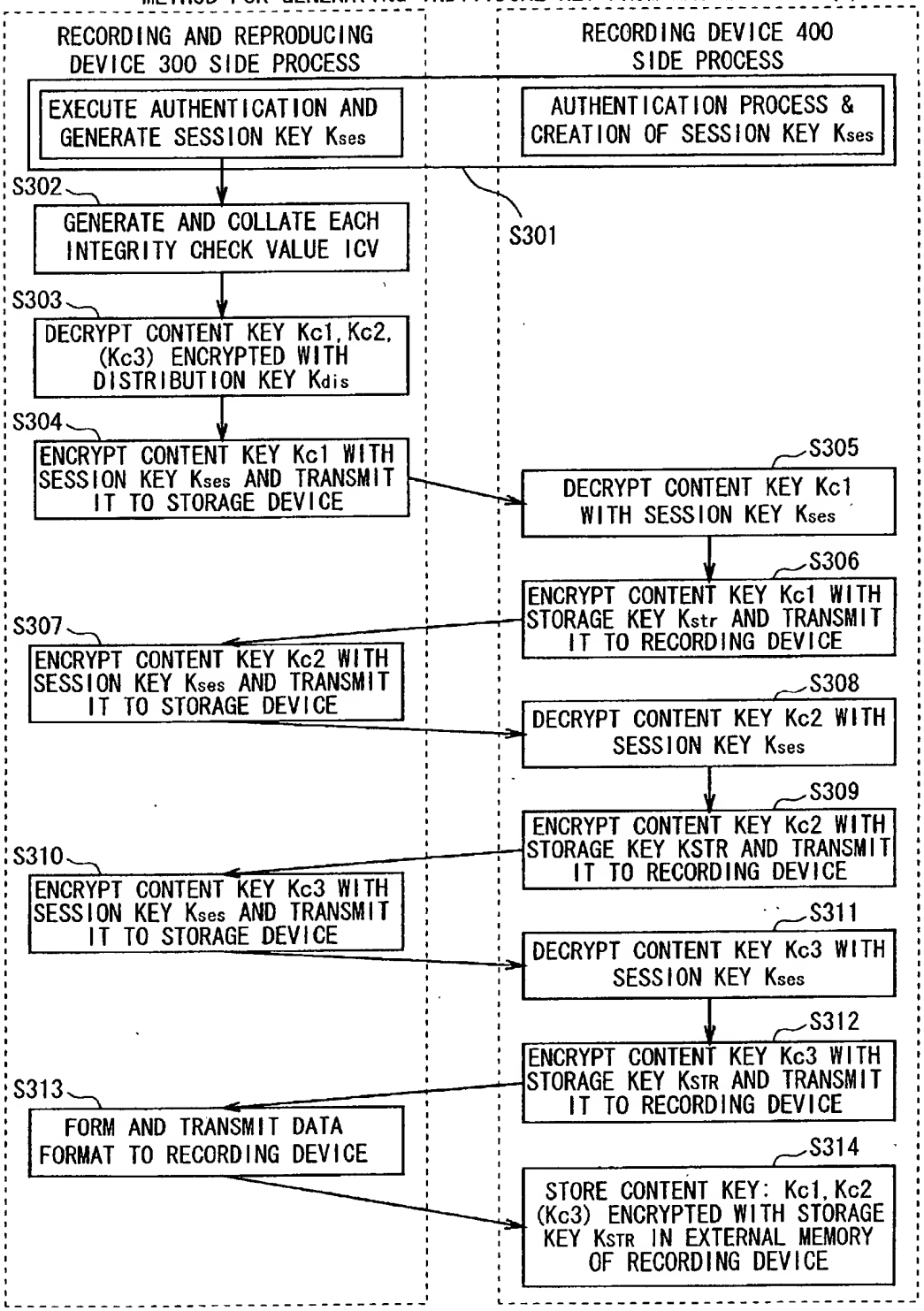


FIG. 56

09/937120

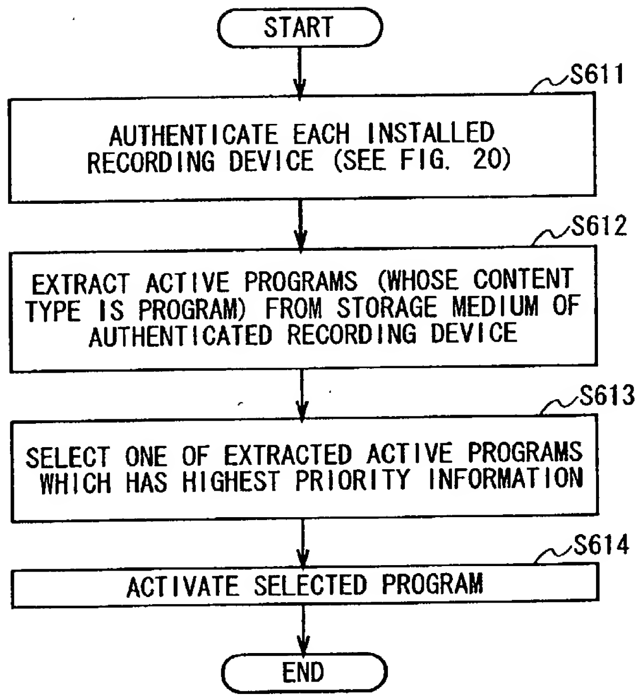


FIG. 57

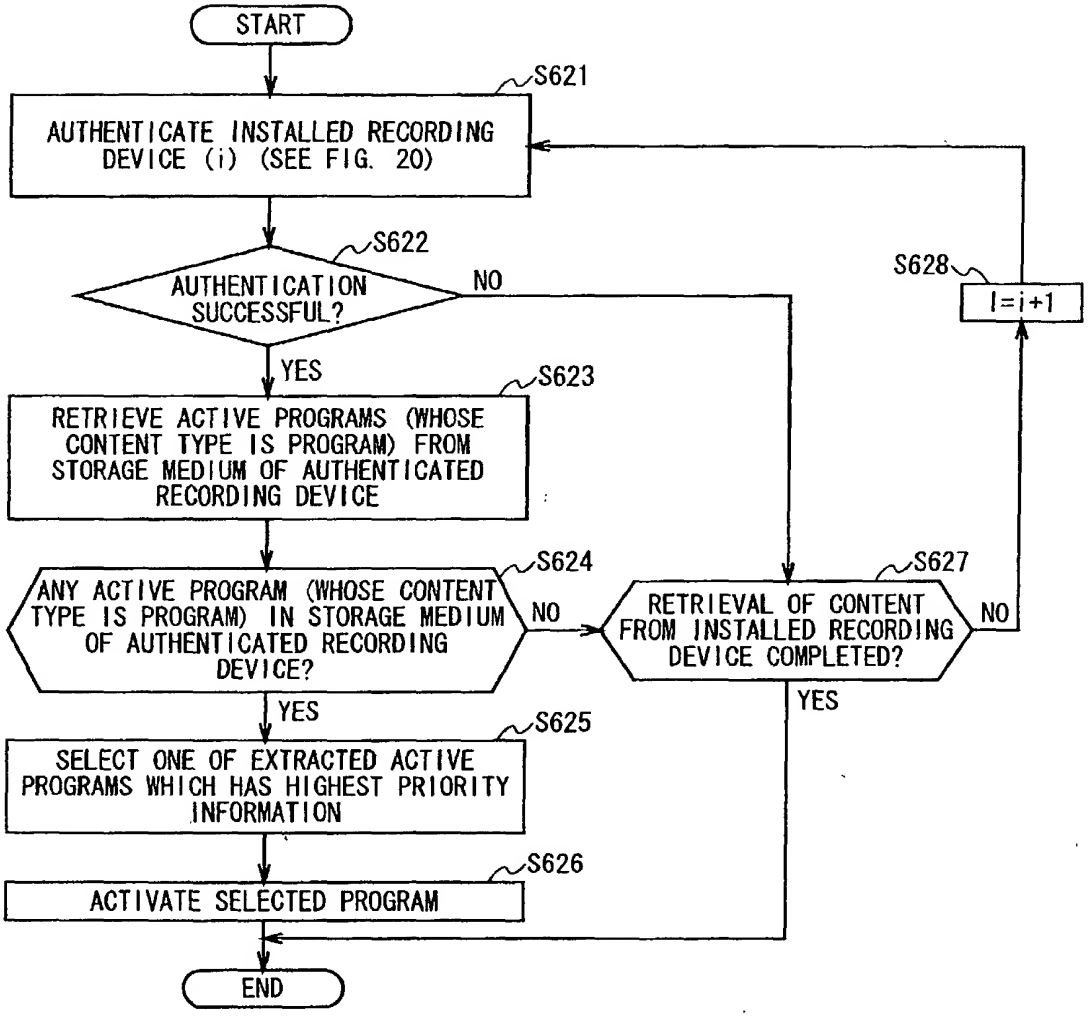

START
S621
AUTHENTICATE INSTALLED RECORDING DEVICE (i) (SEE FIG. 20)
S622
AUTHENTICATION SUCCESSFUL?
NO
YES
S623
RETRIEVE ACTIVE PROGRAMS (WHOSE CONTENT TYPE IS PROGRAM) FROM STORAGE MEDIUM OF AUTHENTICATED RECORDING DEVICE
S624
ANY ACTIVE PROGRAM (WHOSE CONTENT TYPE IS PROGRAM) IN STORAGE MEDIUM OF AUTHENTICATED RECORDING DEVICE?
NO
YES
S625
SELECT ONE OF EXTRACTED ACTIVE PROGRAMS WHICH HAS HIGHEST PRIORITY INFORMATION
S626
ACTIVATE SELECTED PROGRAM
END
S627
RETRIEVAL OF CONTENT FROM INSTALLED RECORDING DEVICE COMPLETED?
NO
YES
S628
I=i+1

FIG. 58

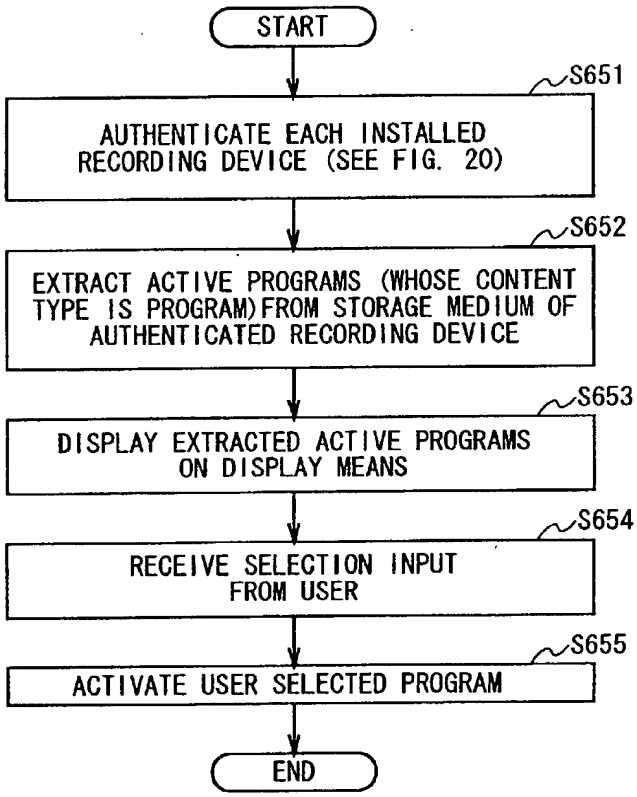

START
S651
AUTHENTICATE EACH INSTALLED RECORDING DEVICE (SEE FIG. 20)
S652
EXTRACT ACTIVE PROGRAMS (WHOSE CONTENT TYPE IS PROGRAM) FROM STORAGE MEDIUM OF AUTHENTICATED RECORDING DEVICE
S653
DISPLAY EXTRACTED ACTIVE PROGRAMS ON DISPLAY MEANS
S654
RECEIVE SELECTION INPUT FROM USER
S655
ACTIVATE USER SELECTED PROGRAM
END

FIG. 59

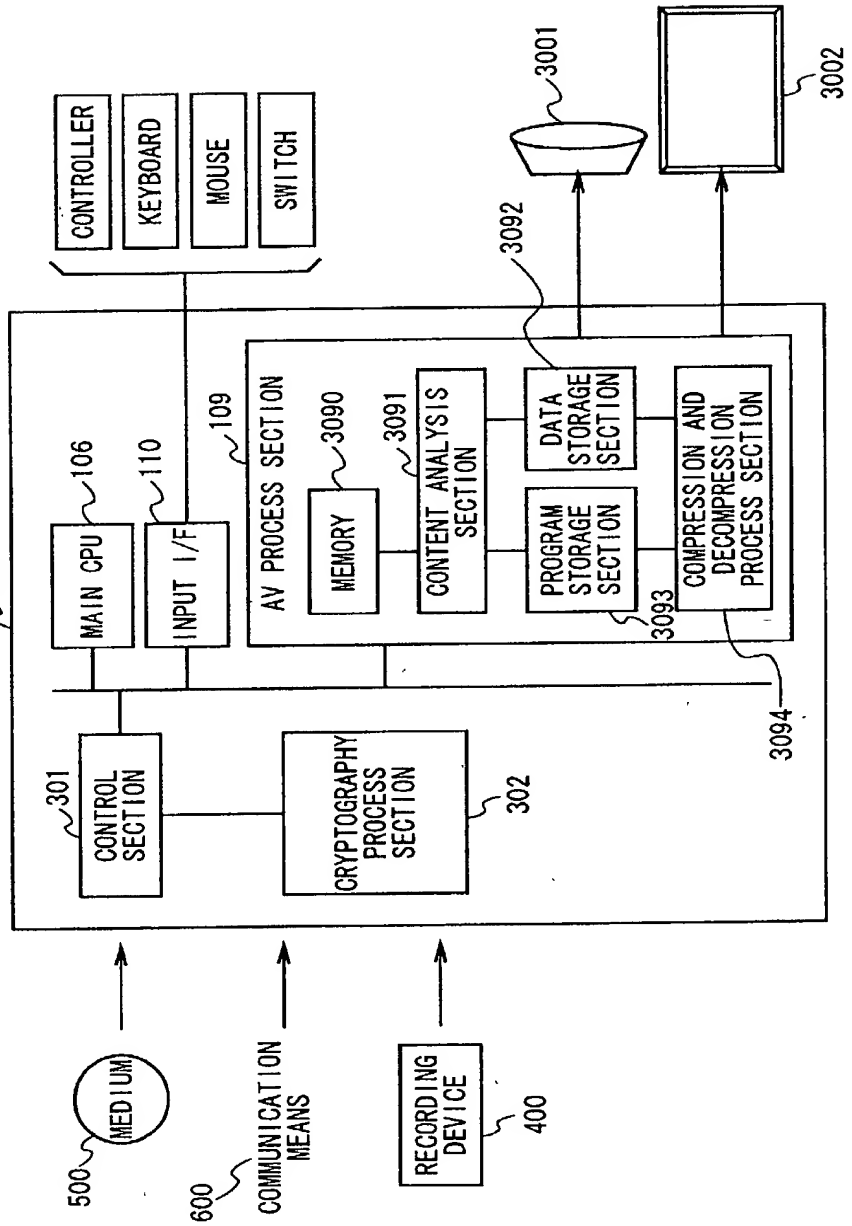

CONTROLLER
KEYBOARD
MOUSE
SWITCH
3001
3002
3092
300
MAIN CPU
106
INPUT I/F
110
109
AV PROCESS SECTION
3090
MEMORY
3091
CONTENT ANALYSIS SECTION
DATA STORAGE SECTION
PROGRAM STORAGE SECTION
3093
COMPRESSION AND DECOMPRESSION PROCESS SECTION
3094
301
CONTROL SECTION
CRYPTOGRAPHY PROCESS SECTION
302
500
MEDIUM
600
COMMUNICATION MEANS
RECORDING DEVICE
400

FIG. 60

EXAMPLE OF CONTENT CONFIGURATION (1)

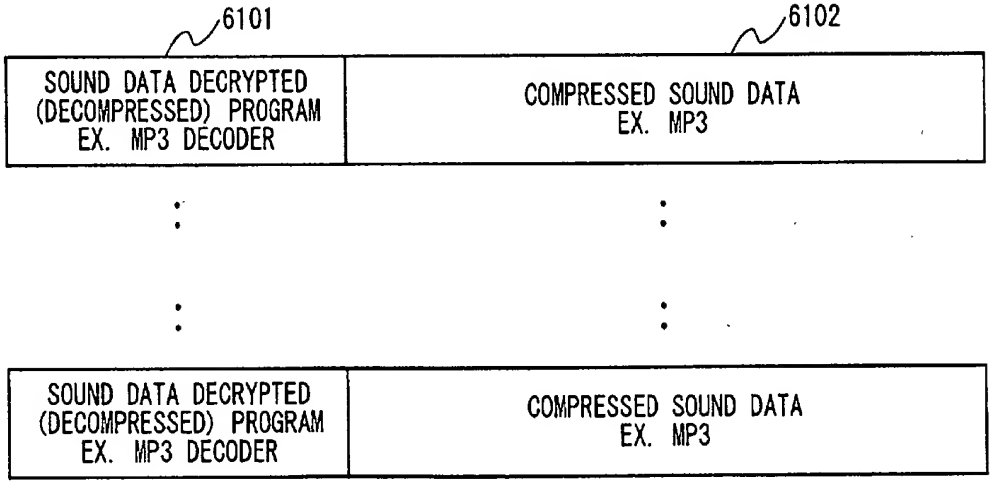


FIG. 61

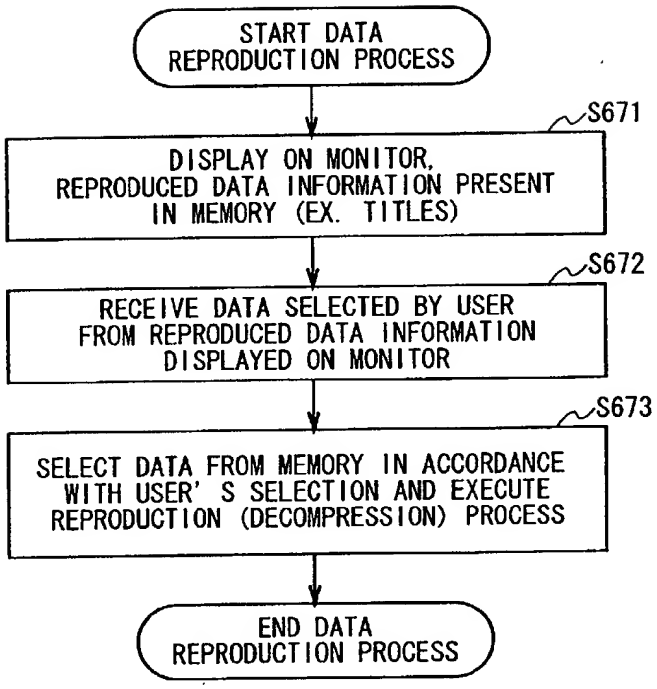

START DATA REPRODUCTION PROCESS
S671
DISPLAY ON MONITOR, REPRODUCED DATA INFORMATION PRESENT IN MEMORY (EX. TITLES)
S672
RECEIVE DATA SELECTED BY USER FROM REPRODUCED DATA INFORMATION DISPLAYED ON MONITOR
S673
SELECT DATA FROM MEMORY IN ACCORDANCE WITH USER' S SELECTION AND EXECUTE REPRODUCTION (DECOMPRESSION) PROCESS
END DATA REPRODUCTION PROCESS

FIG. 62

EXAMPLE OF CONTENT CONFIGURATION (2)

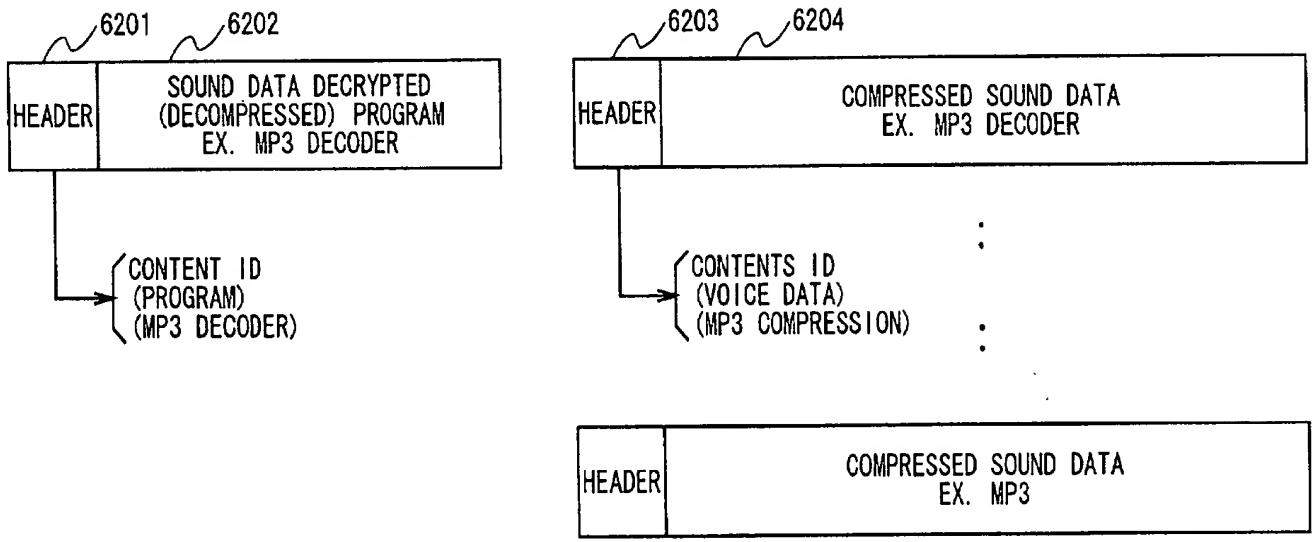


FIG. 63

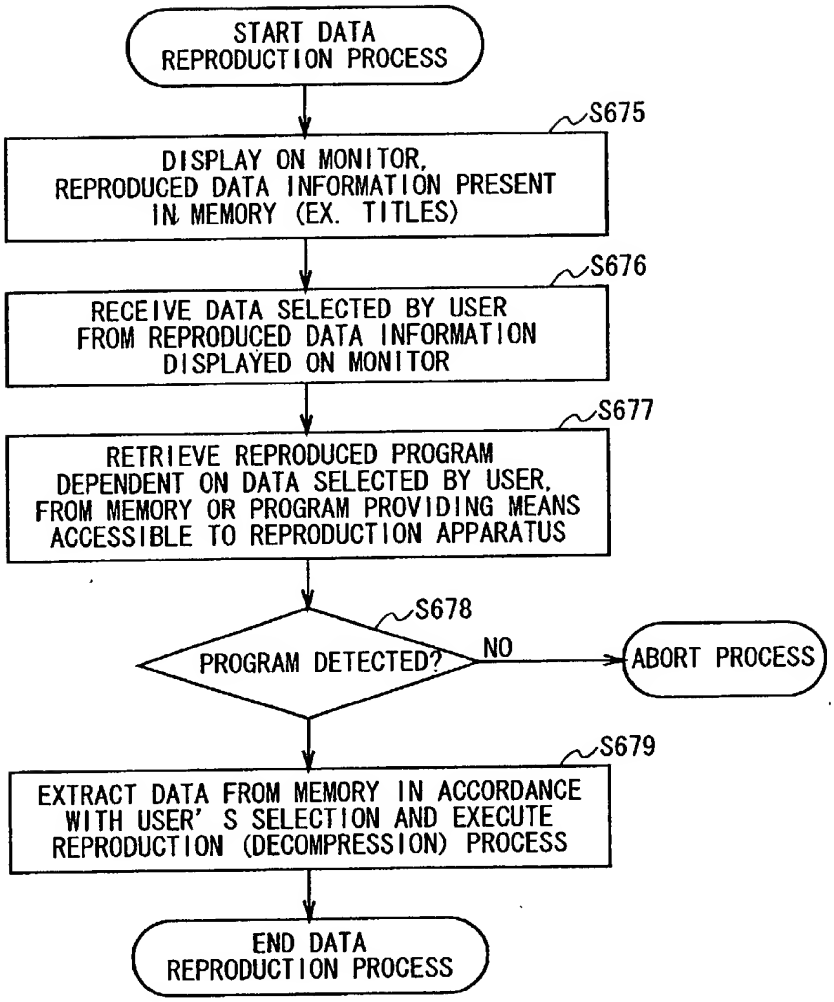

START DATA REPRODUCTION PROCESS
S675
DISPLAY ON MONITOR, REPRODUCED DATA INFORMATION PRESENT IN MEMORY (EX. TITLES)
S676
RECEIVE DATA SELECTED BY USER FROM REPRODUCED DATA INFORMATION DISPLAYED ON MONITOR
S677
RETRIEVE REPRODUCED PROGRAM DEPENDENT ON DATA SELECTED BY USER, FROM MEMORY OR PROGRAM PROVIDING MEANS ACCESSIBLE TO REPRODUCTION APPARATUS
S678
PROGRAM DETECTED?
NO
ABORT PROCESS
S679
EXTRACT DATA FROM MEMORY IN ACCORDANCE WITH USER' S SELECTION AND EXECUTE REPRODUCTION (DECOMPRESSION) PROCESS
END DATA REPRODUCTION PROCESS

FIG. 64

EXAMPLE OF CONTENT CONFIGURATION (3)

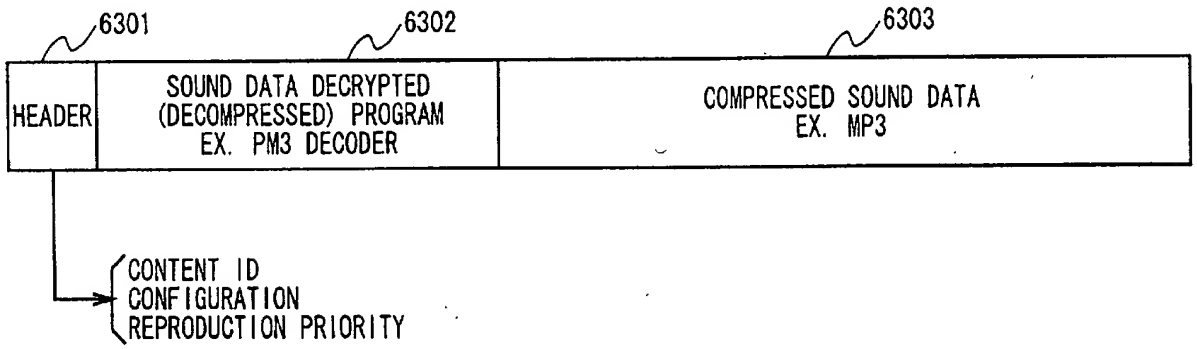


FIG. 65

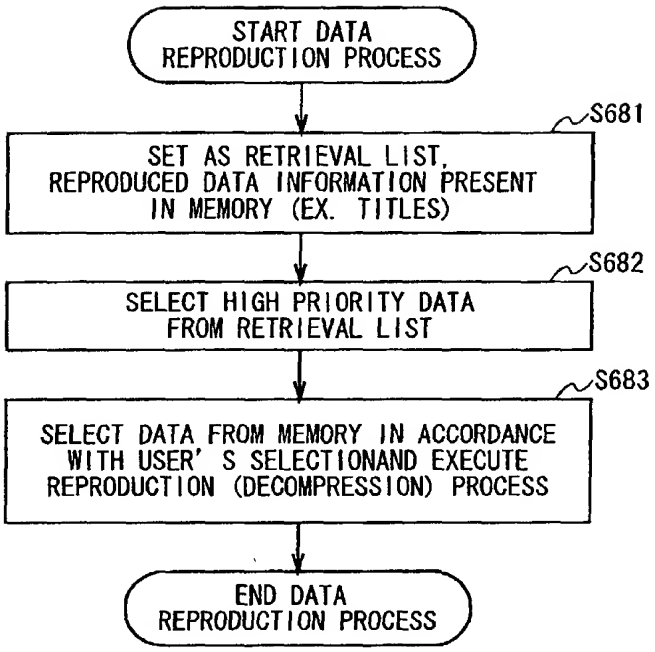

START DATA REPRODUCTION PROCESS
S681
SET AS RETRIEVAL LIST, REPRODUCED DATA INFORMATION PRESENT IN MEMORY (EX. TITLES)
S682
SELECT HIGH PRIORITY DATA FROM RETRIEVAL LIST
S683
SELECT DATA FROM MEMORY IN ACCORDANCE WITH USER' S SELECTIONAND EXECUTE REPRODUCTION (DECOMPRESSION) PROCESS
END DATA REPRODUCTION PROCESS

FIG. 66

EXAMPLE OF CONTENT CONFIGURATION (4)

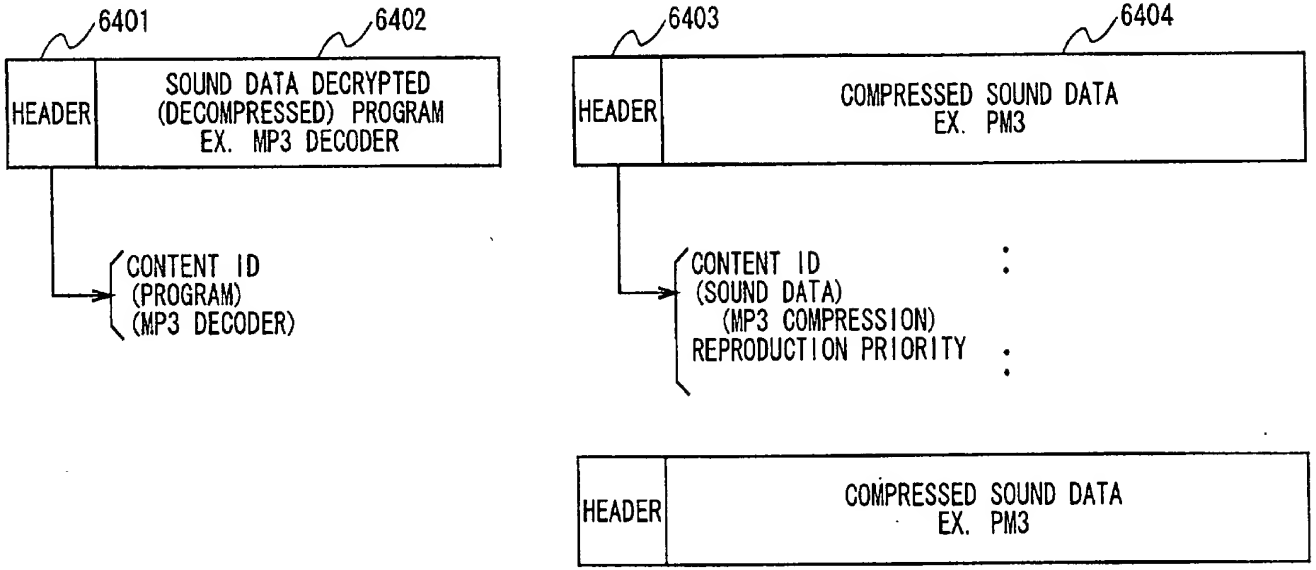


FIG. 67

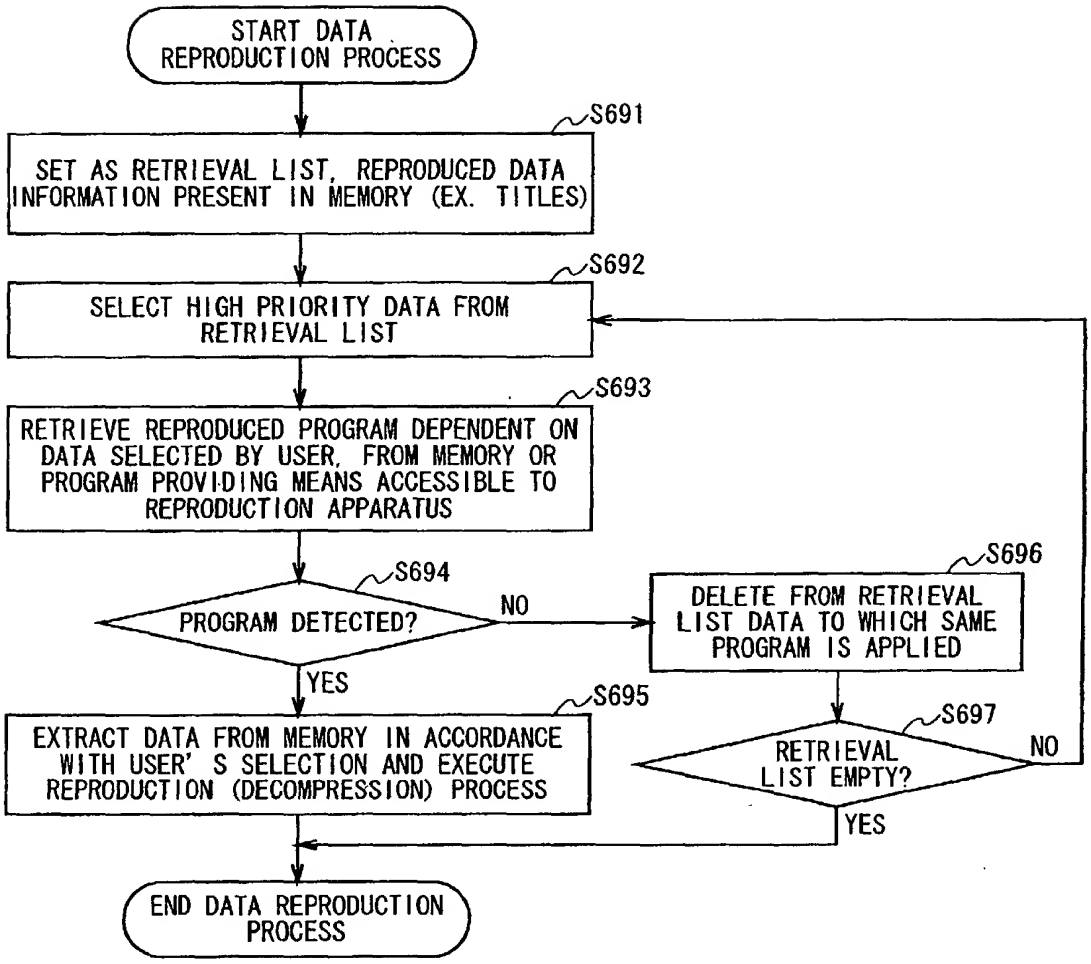
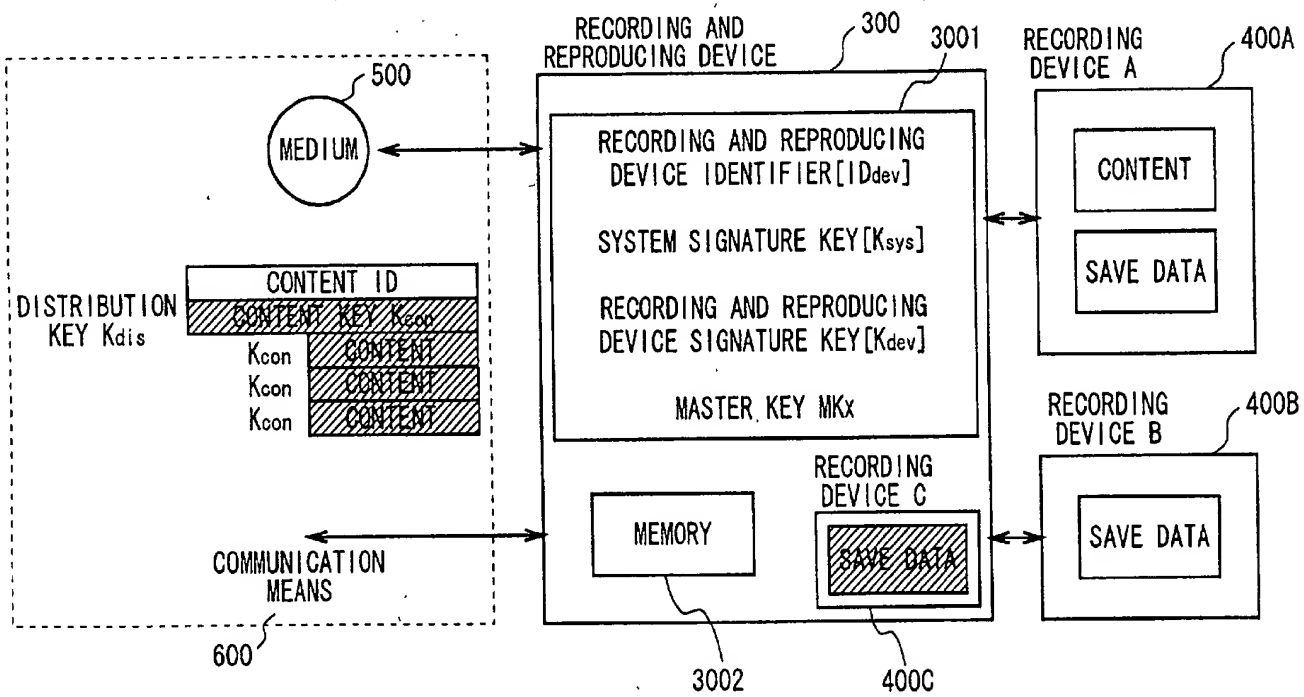

START DATA REPRODUCTION PROCESS
S691
SET AS RETRIEVAL LIST, REPRODUCED DATA INFORMATION PRESENT IN MEMORY (EX. TITLES)
S692
SELECT HIGH PRIORITY DATA FROM RETRIEVAL LIST
S693
RETRIEVE REPRODUCED PROGRAM DEPENDENT ON DATA SELECTED BY USER, FROM MEMORY OR PROGRAM PROVIDING MEANS ACCESSIBLE TO REPRODUCTION APPARATUS
S694
PROGRAM DETECTED?
NO
YES
S696
DELETE FROM RETRIEVAL LIST DATA TO WHICH SAME PROGRAM IS APPLIED
S695
EXTRACT DATA FROM MEMORY IN ACCORDANCE WITH USER' S SELECTION AND EXECUTE REPRODUCTION (DECOMPRESSION) PROCESS
S697
RETRIEVAL LIST EMPTY?
NO
YES
END DATA REPRODUCTION PROCESS

FIG. 68



SAVE DATA CRYPTOGRAPHY KEY:Ksav=Kcon
SAVE DATA CRYPTOGRAPHY KEY:Ksav=Ksys
SAVE DATA CRYPTOGRAPHY KEY:Ksav=Kdev
SAVE DATA CRYPTOGRAPHY KEY:Ksav=CONTENT ID OR DES (MKx, CONTENT ID)
SAVE DATA CRYPTOGRAPHY KEY:Ksav=RECORDING AND REPRODUCING DEVICE ID(IDdev) or DES (MKx, RECORDING AND REPRODUCING DEVICE ID(IDdev))
SAVE DATA CRYPTOGRAPHY KEY:Ksav=(Kcon^Kdev)or DES(MKx, Kcon^Kdev)
SAVE DATA CRYPTOGRAPHY KEY:Ksav=(CONTENT ID^Kdev)or DES(MKx, CONTENT ID^Kdev)
SAVE DATA CRYPTOGRAPHY KEY:Ksav=(KCON^RECORDING AND REPRODUCING DEVICE ID) OR DES (MKx, KCON^RECORDING AND REPRODUCING DEVICE ID)
SAVE DATA CRYPTOGRAPHY KEY:Ksav=(CONTENT ID^RECORDING AND REPRODUCING DEVICE ID) OR DES (MKX, CONTENT ID^RECORDING AND REPRODUCING DEVICE ID)
SAVE DATA CRYPTOGRAPHY KEY:Ksav=PASSWORD OR DES(MKX, PASSWORD) ETC.

FIG. 69

(1) EXAMPLE OF SAVE DATA STORAGE PROCESS USING CONTENT UNIQUE KEY CONTENT OR SYSTEM COMMON KEY

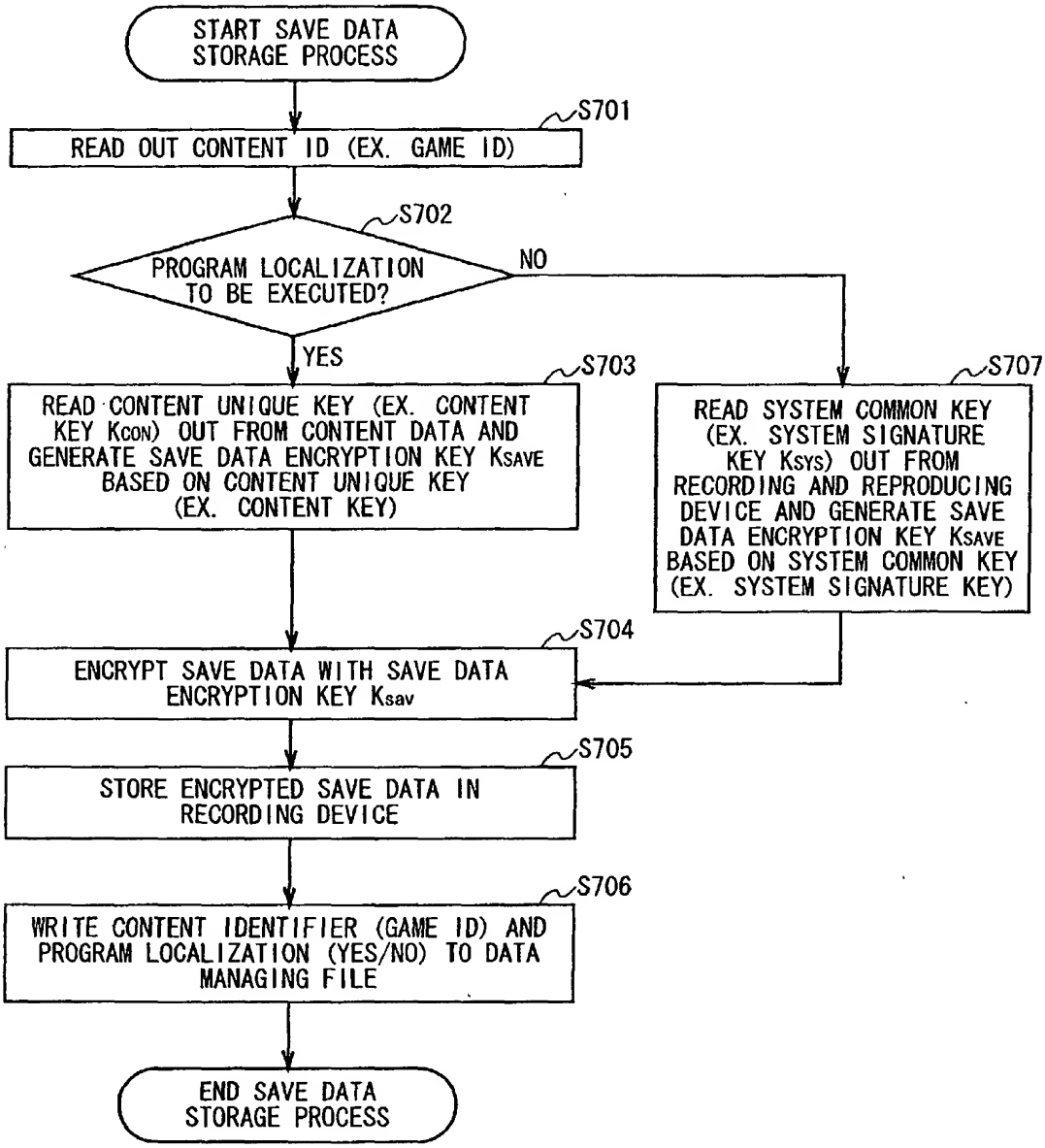


FIG. 70

DATA MANAGING FILE(1)

DATA NUMBER	CONTENT ID (GAME ID)	RECORDING AND REPRODUCING DEVICE ID (IDDEV)	PROGRAM LOCALIZATION
1	12345678...	56789012...	YES
2	ABCDEF12...	09876543...	YES
3	12245678...	58834762...	NO
:	:	:	:

FIG. 71

(2) EXAMPLE OF SAVE DATA REPRODUCTION PROCESS USING CONTENT UNIQUE KEY OR SYSTEM COMMON KEY

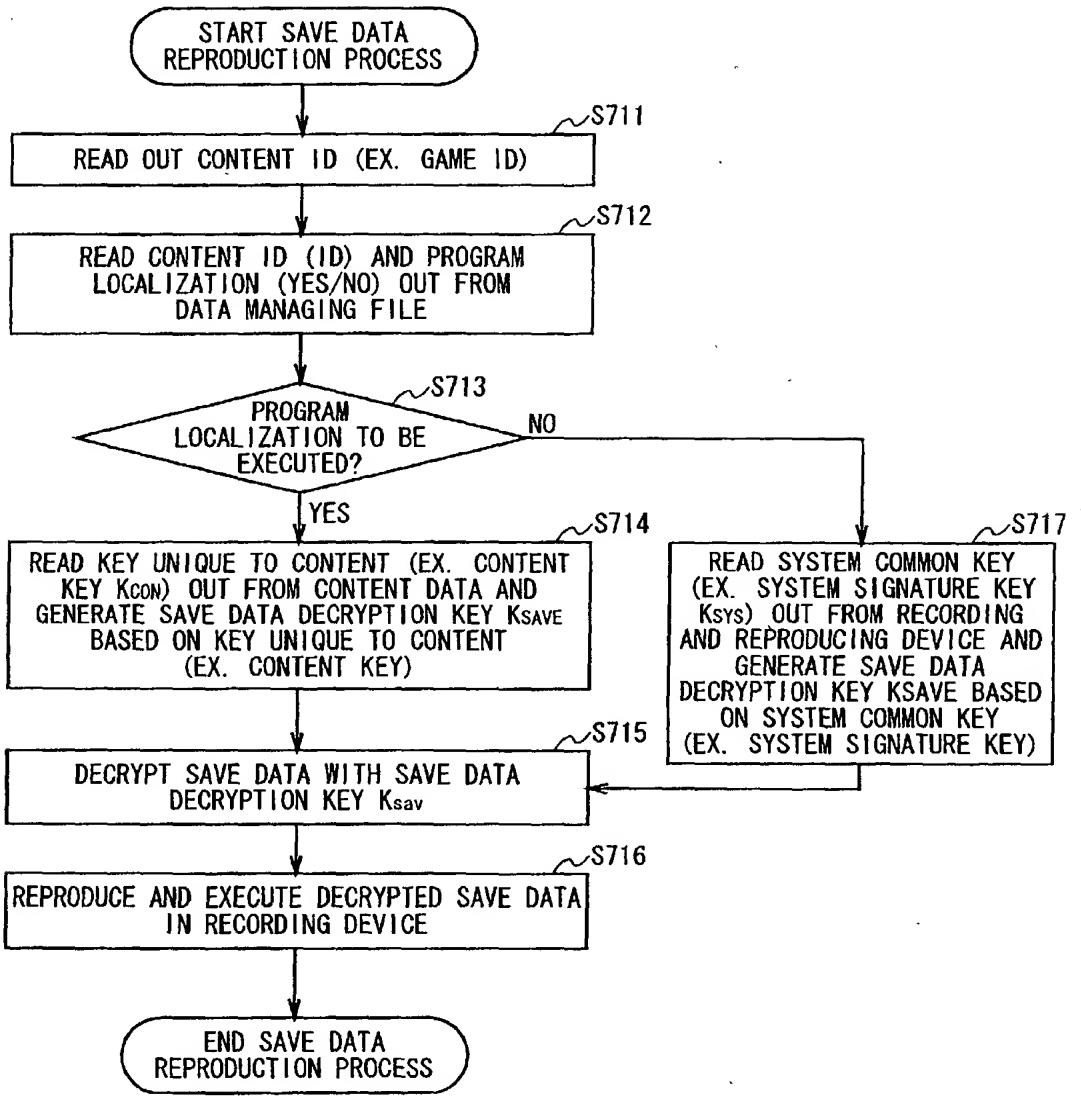


FIG. 72

(3) EXAMPLE OF SAVE DATA STORAGE PROCESS USING CONTENT ID OR SYSTEM COMMON KEY

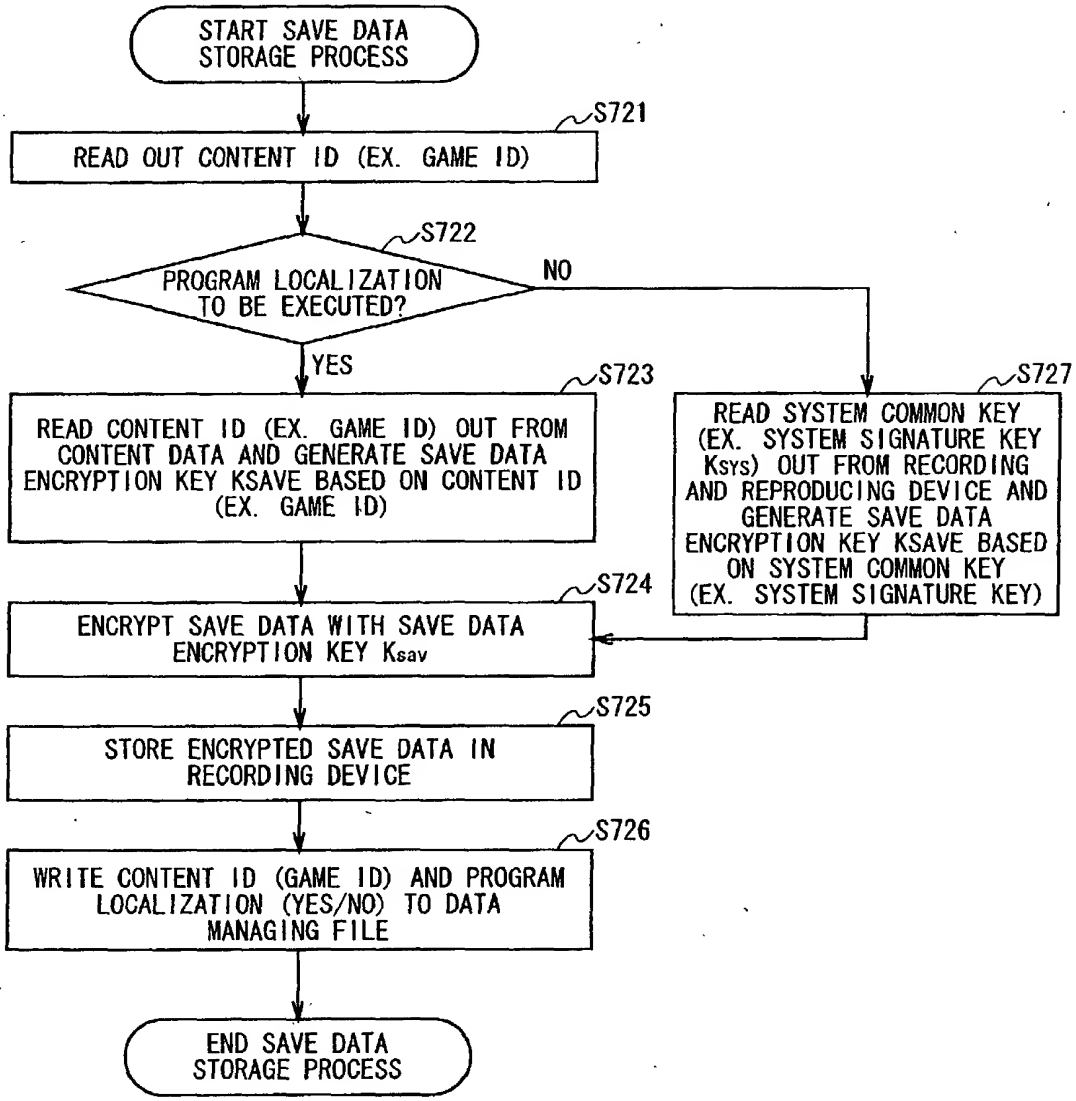


FIG. 73

(4) EXAMPLE OF SAVE DATA REPRODUCTION PROCESS USING CONTENT ID OR SYSTEM COMMON KEY

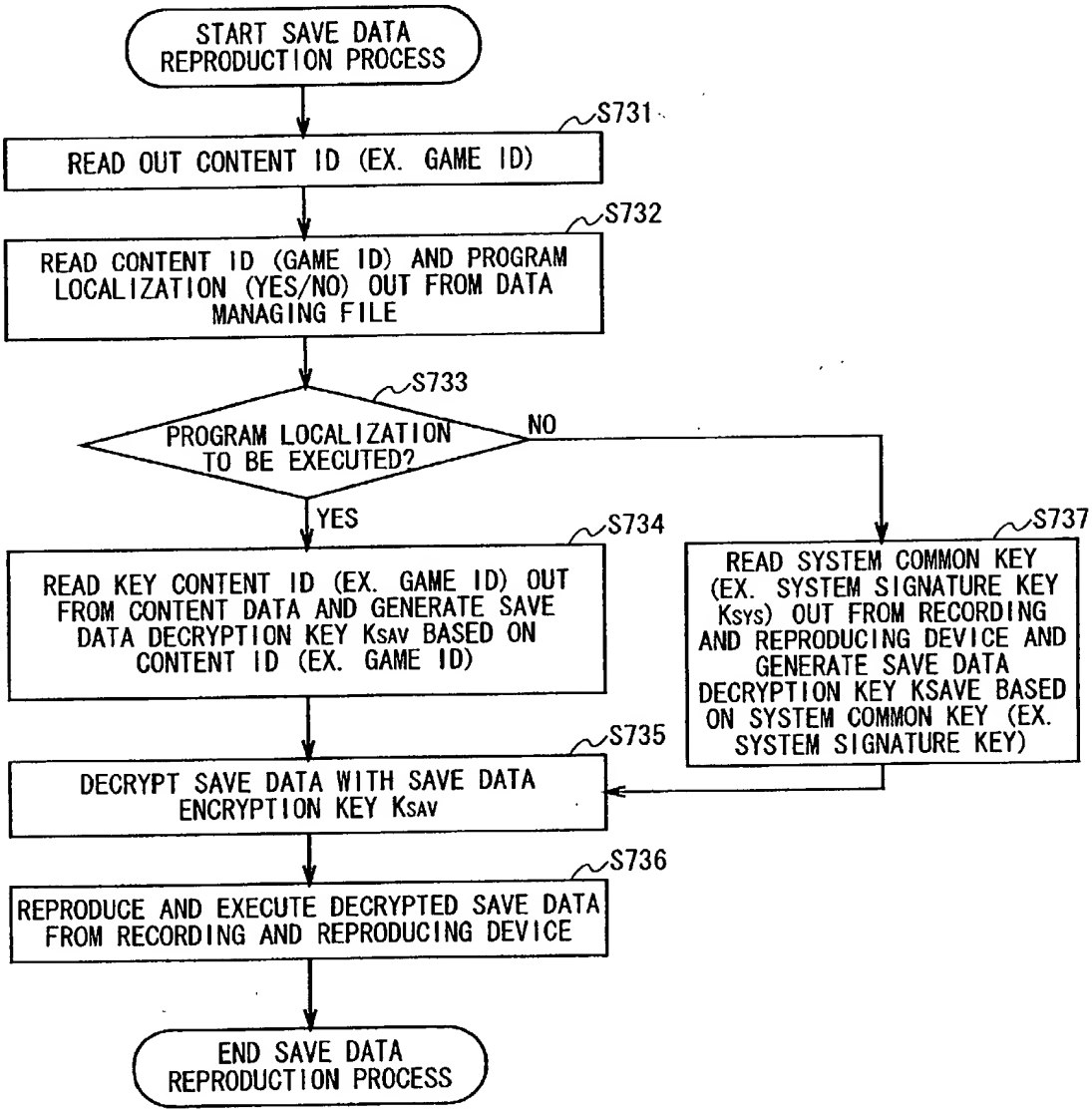


FIG. 74

(5) EXAMPLE OF SAVE DATA STORAGE PROCESS USING RECORDING AND REPRODUCING DEVICE UNIQUE KEY OR SYSTEM COMMON KEY

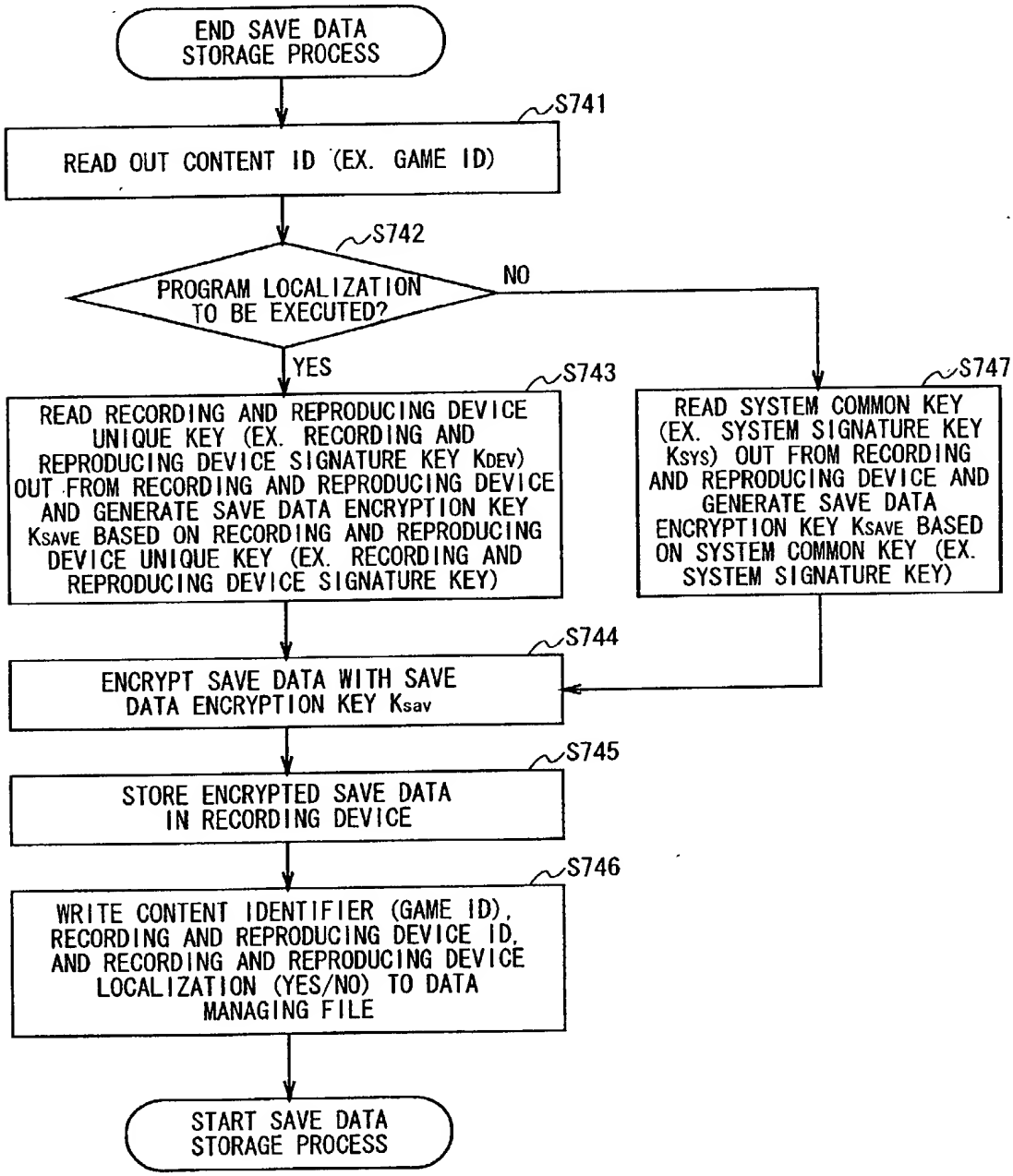


FIG. 75

DATA MANAGING FILE(2)

DATA NUMBER	CONTENT ID (GAME ID)	RECORDING AND REPRODUCING DEVICE ID (IDdev)	PROGRAM LOCALIZATION
1	12345678...	56789012...	NO
2	ABCDEF12...	09876543...	YES
3	12245678...	58834762...	YES
:	:	:	:

FIG. 76

(6) EXAMPLE OF SAVE DATA REPRODUCTION PROCESS USING RECORDING AND REPRODUCING DEVICE UNIQUE KEY OR SYSTEM COMMON KEY

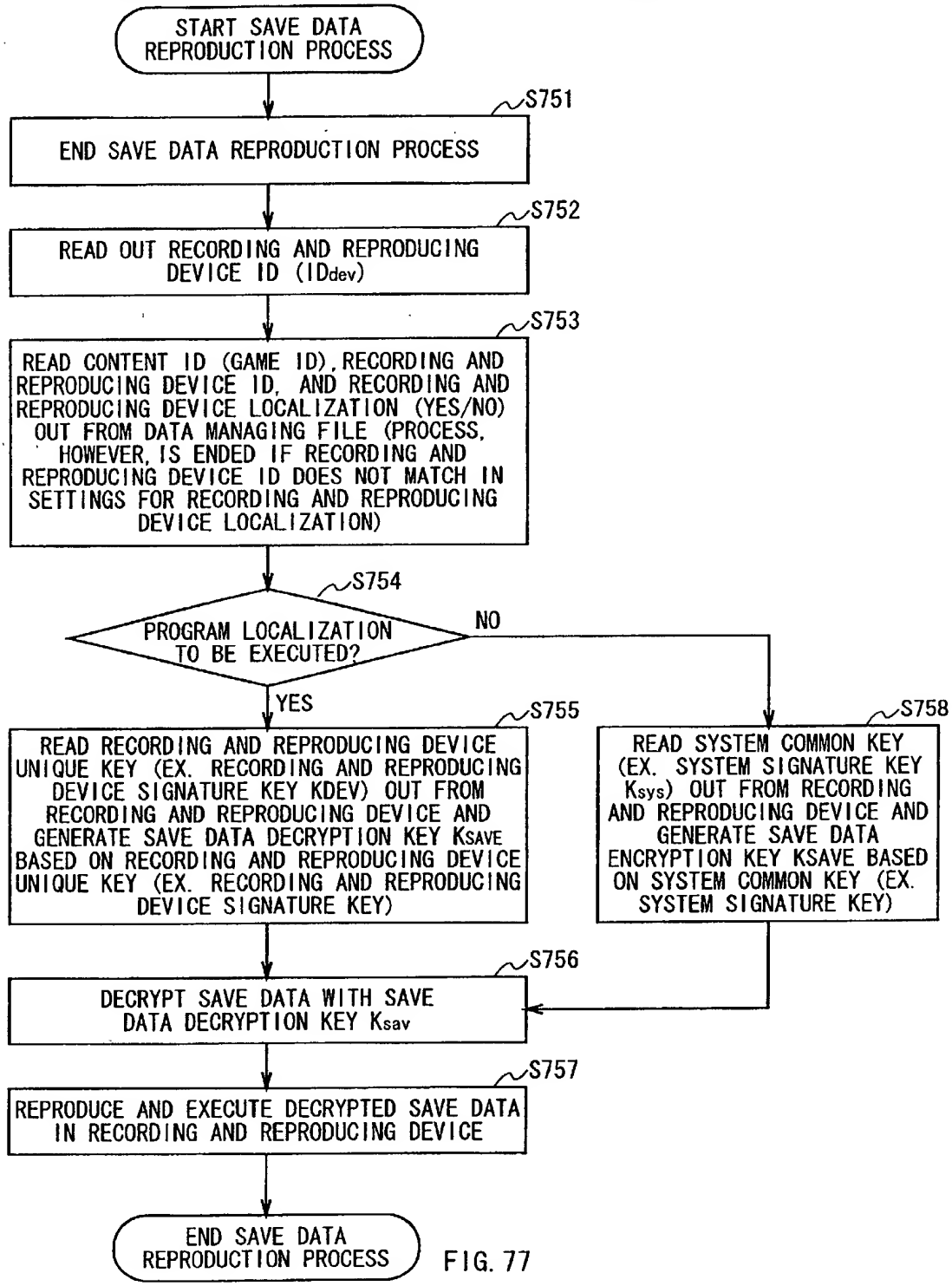


FIG. 77

(7) EXAMPLE OF SAVE DATA STORAGE PROCESS USING RECORDING AND REPRODUCING DEVICE ID OR SYSTEM COMMON KEY

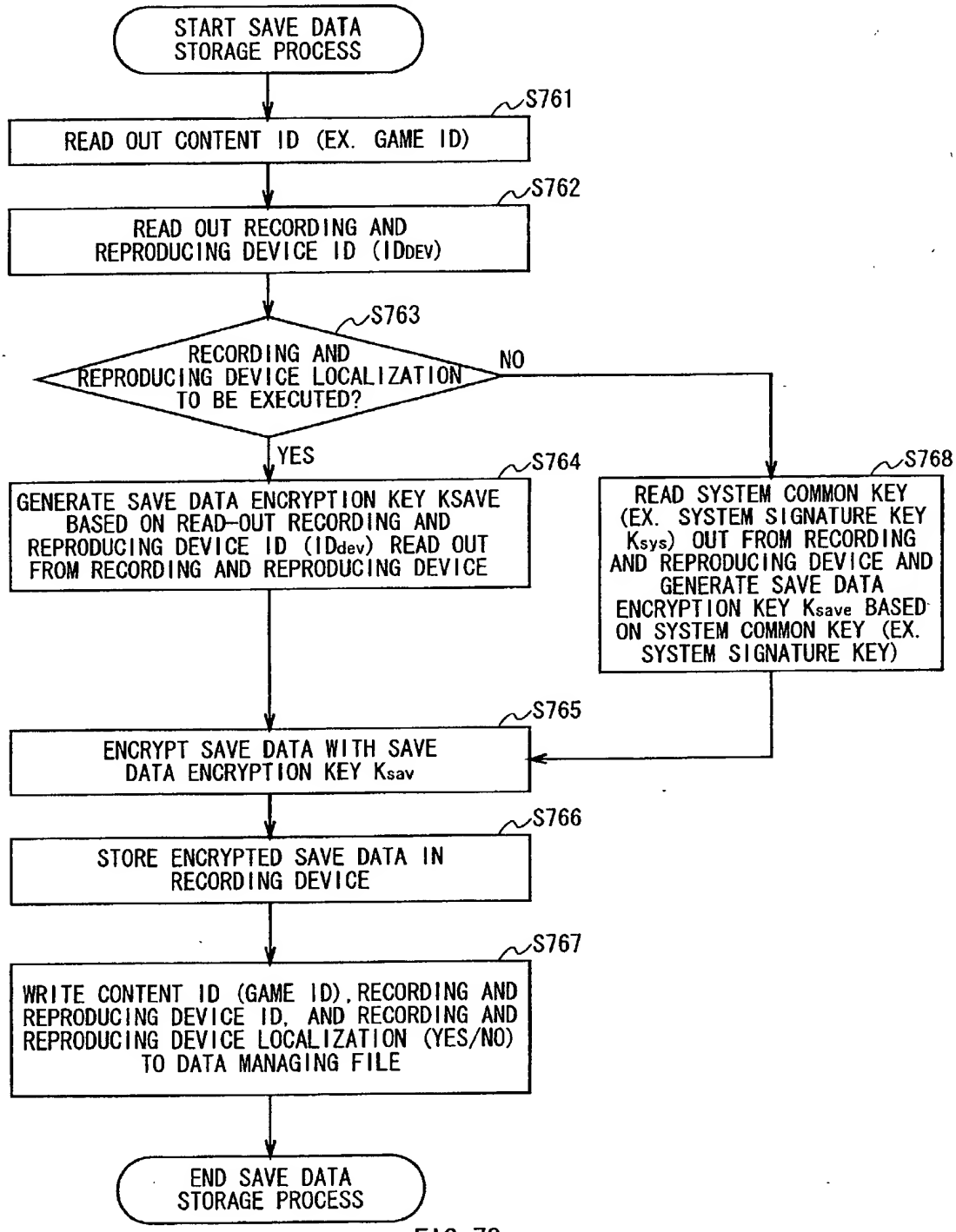


FIG. 78

(8) EXAMPLE OF SAVE DATA REPRODUCTION PROCESS USING RECORDING AND REPRODUCING DEVICE ID OR SYSTEM COMMON KEY

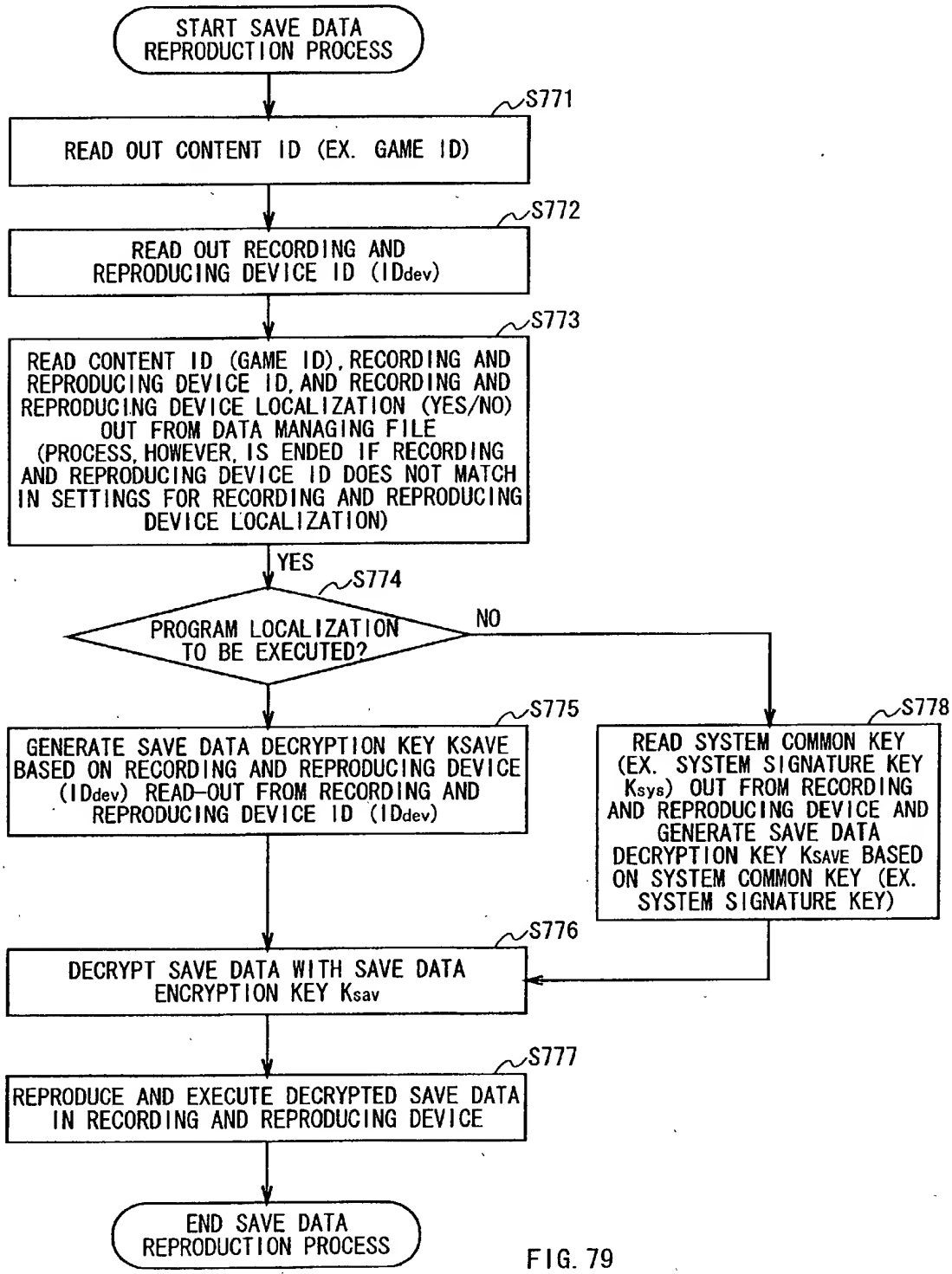


FIG. 79

(9) EXAMPLE OF SAVE DATA STORAGE PROCESS USING CONTENT UNIQUE KEY, RECORDING AND REPRODUCING DEVICE UNIQUE KEY, OR SYSTEM COMMON KEY

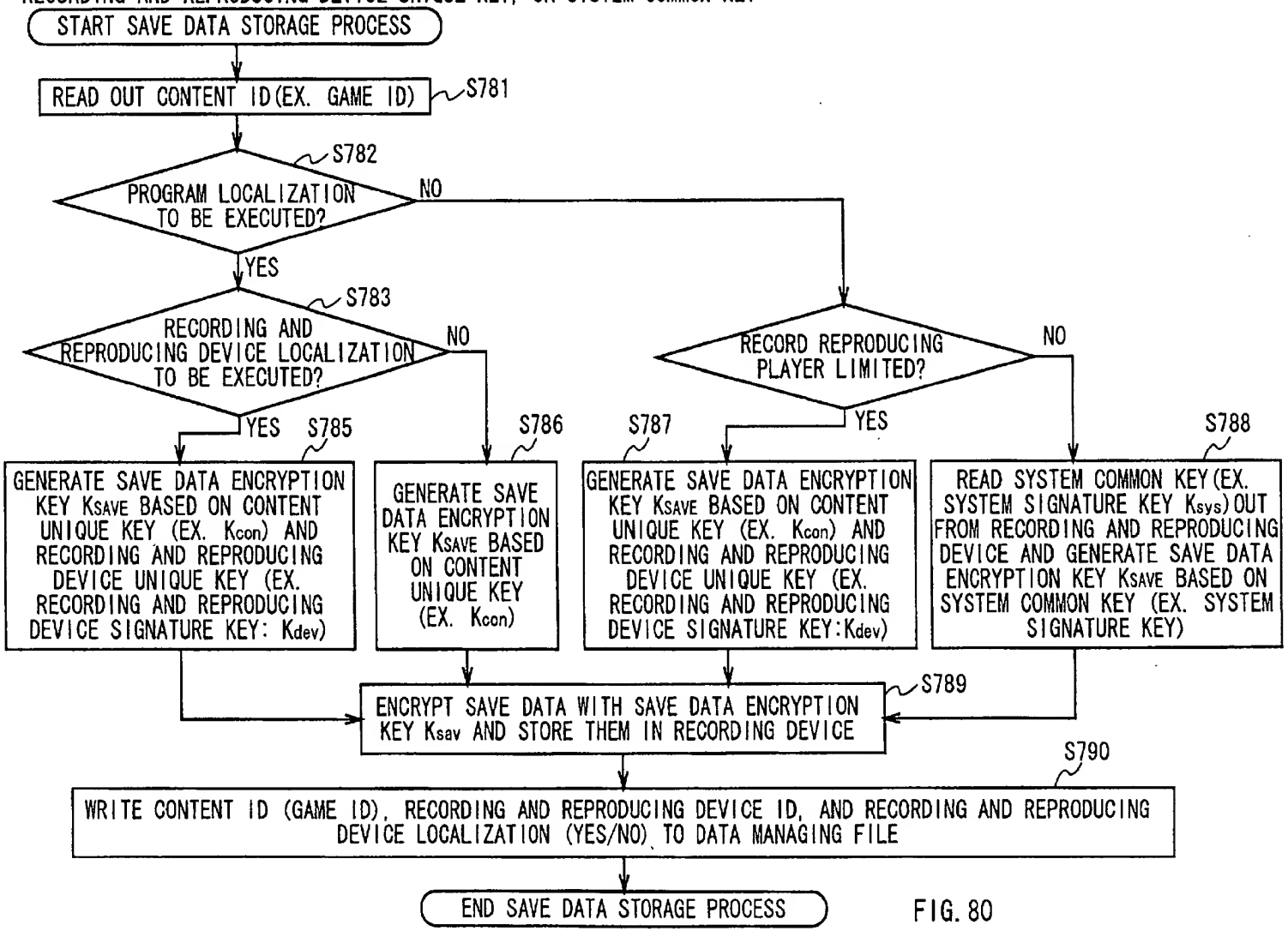


FIG. 80

DATA MANAGING FILE(3)

DATA NUMBER	CONTENT ID (GAME ID)	RECORDING AND REPRODUCING DEVICE ID (ID_{dev})	PROGRAM LOCALIZATION	RECORDING AND REPRODUCING DEVICE LOCALIZATION
1	123455678...	56789012...	YES	NO
2	ABCDEF12...	09876543...	YES	YES
3	1122457678	58834762...	NO	YES
⋮	⋮	⋮	⋮	⋮

FIG. 81

(10) EXAMPLE OF SAVE DATA REPRODUCTION PROCESS USING CONTENT UNIQUE KEY, RECORDING AND REPRODUCING DEVICE UNIQUE KEY, OR SYSTEM COMMON KEY

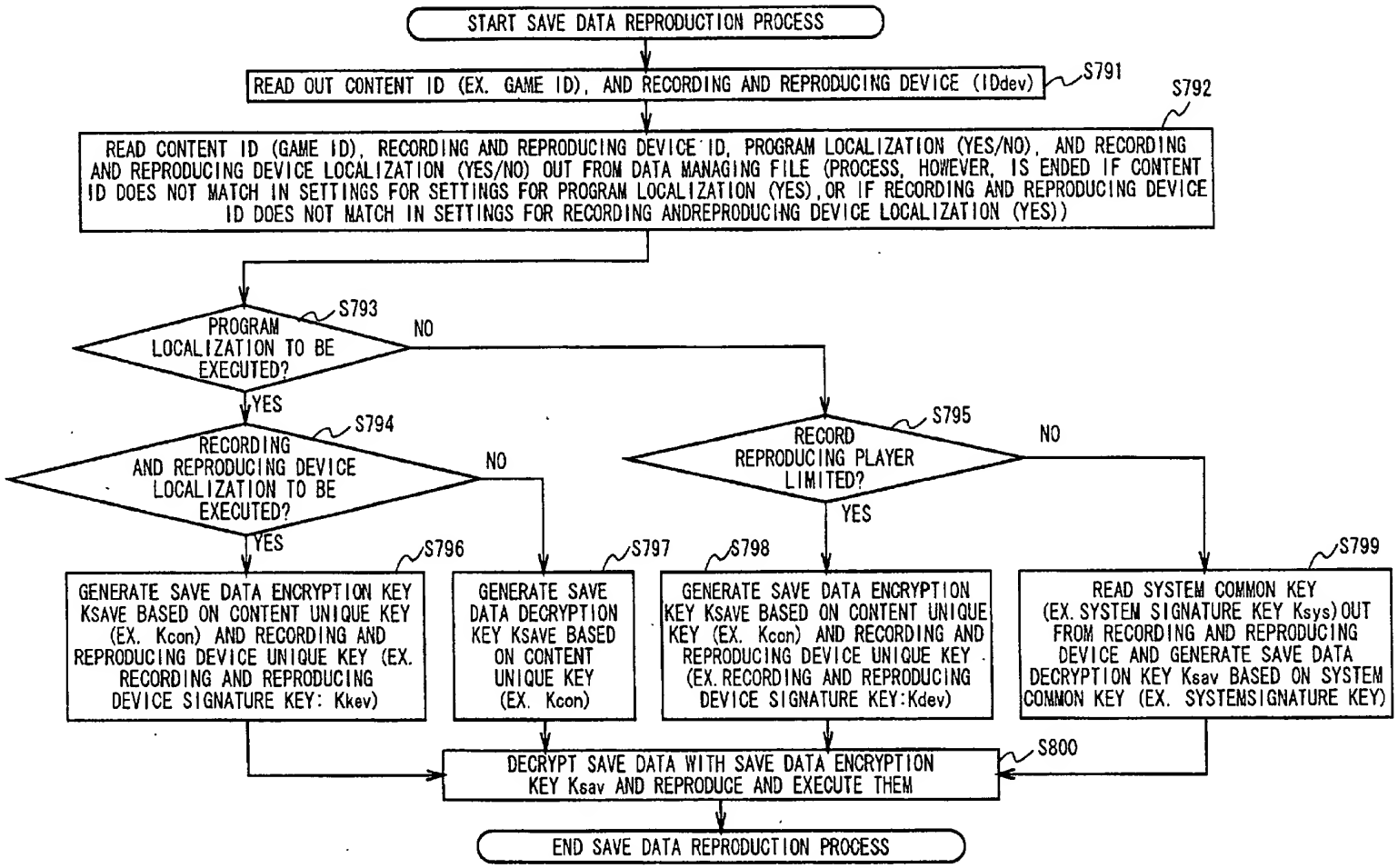


FIG. 82

(11) EXAMPLE OF SAVE DATA STORAGE PROCESS USING USER PASSWORD OR SYSTEM COMMON KEY

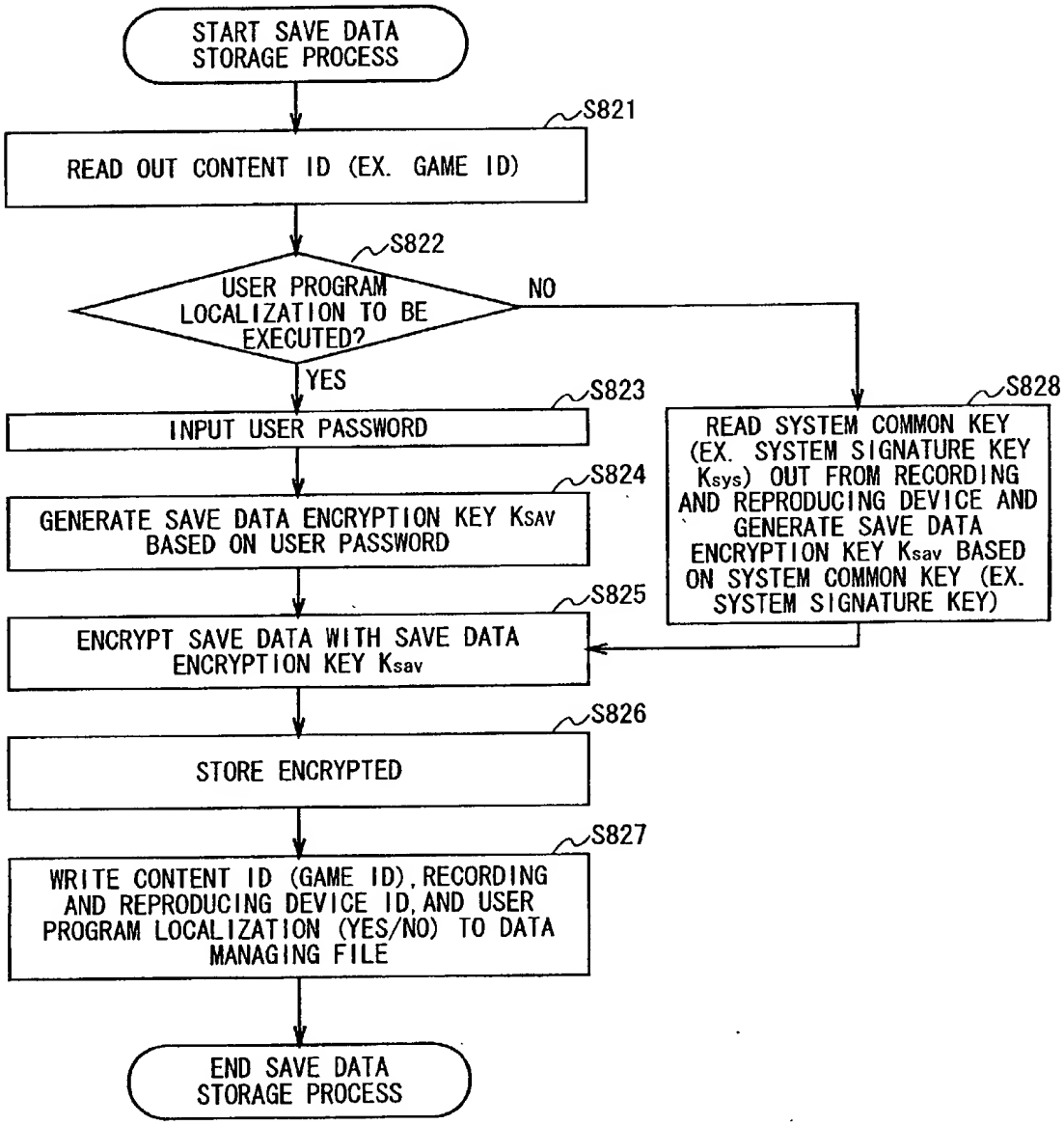


FIG. 83

DATA MANAGING FILE(4)

DATA NUMBER	CONTENT ID (GAME ID)	RECORDING AND REPRODUCING DEVICE ID (ID_{dev})	USER PROGRAM LOCALIZATION
1	123455678...	56789012...	YES
2	ABCDEF12...	09876543...	YES
3	1122457678	58834762...	NO
⋮	⋮	⋮	⋮

FIG. 84

(12) EXAMPLE OF SAVE DATA REPRODUCTION PROCESS USING USER PASSWORD OR SYSTEM COMMON KEY

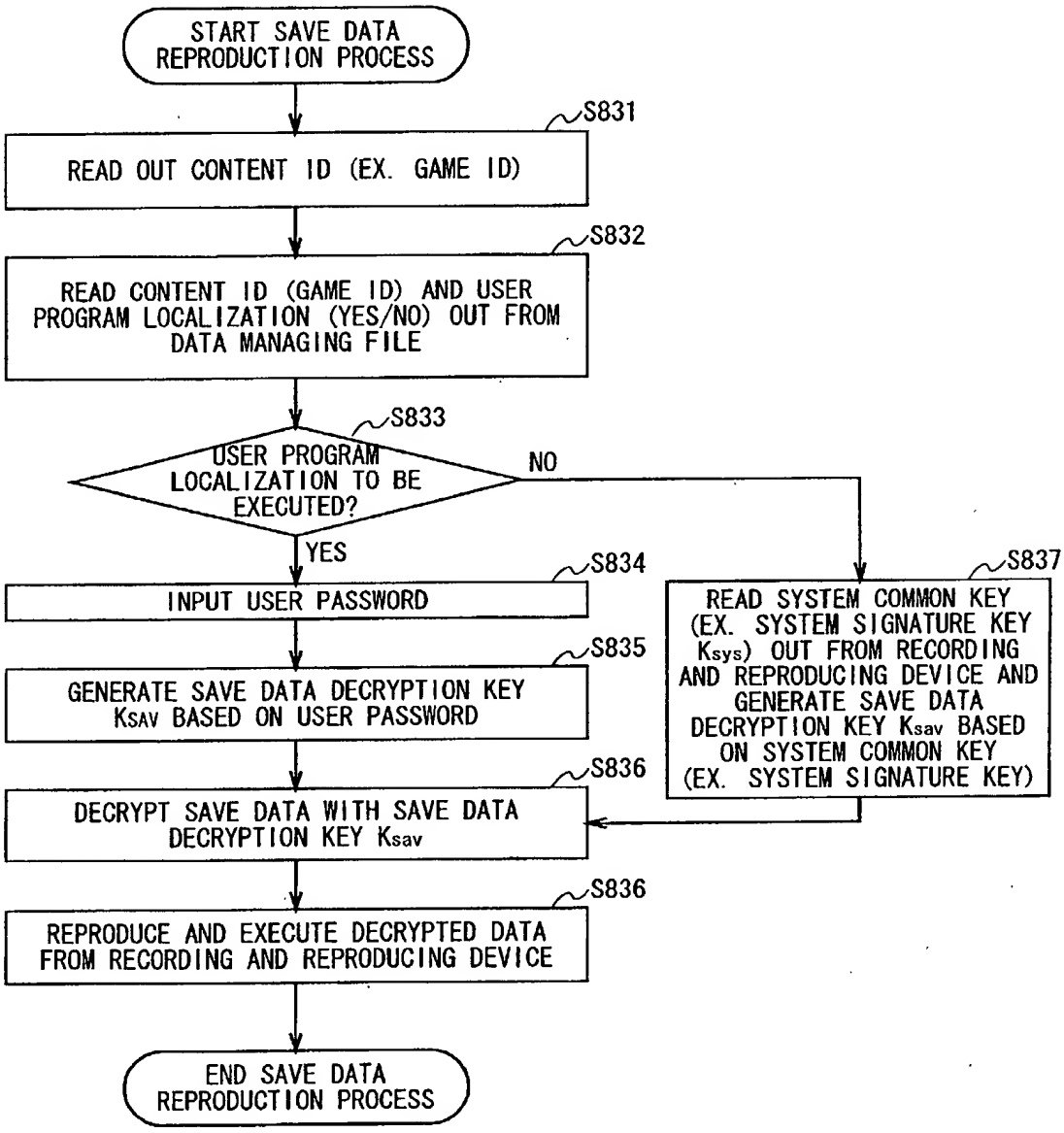


FIG. 85

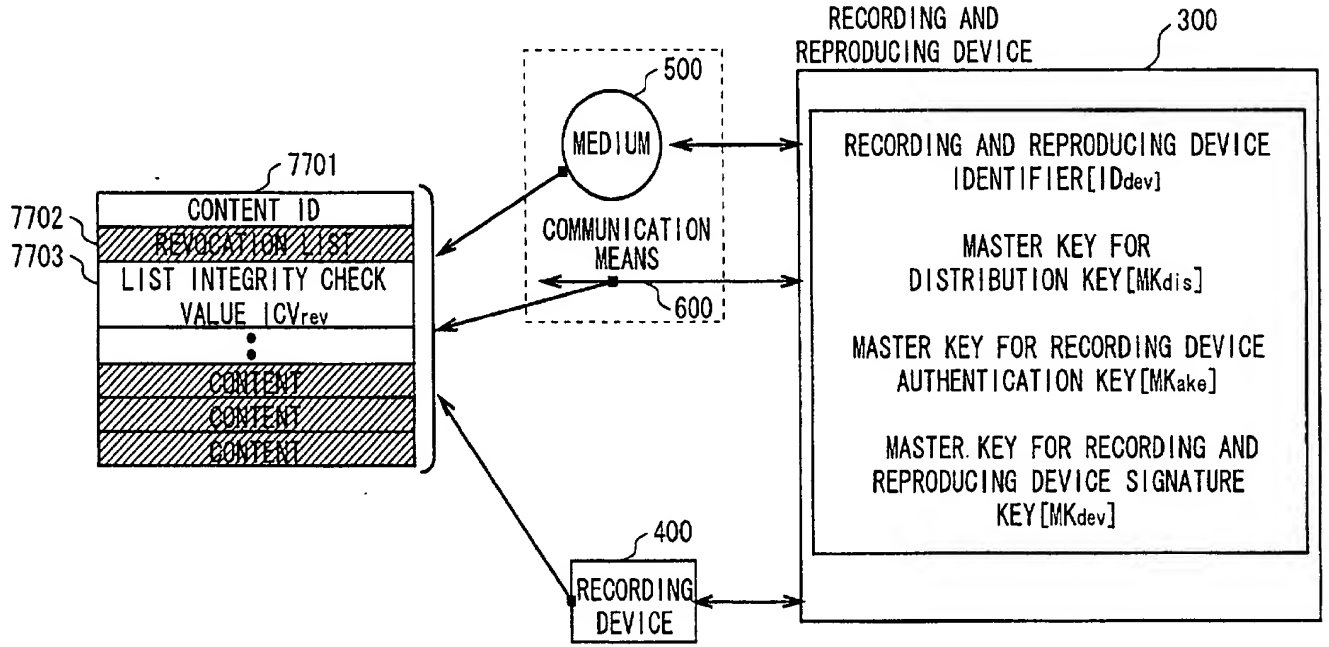

RECORDING AND REPRODUCING DEVICE
300
500
MEDIUM
7701
7702
7703
CONTENT ID
REVOCATION LIST
LIST INTEGRITY CHECK VALUE ICVrev
CONTENT
CONTENT
CONTENT
COMMUNICATION MEANS
600
RECORDING AND REPRODUCING DEVICE IDENTIFIER[IDdev]
MASTER KEY FOR DISTRIBUTION KEY[MKdis]
MASTER KEY FOR RECORDING DEVICE AUTHENTICATION KEY[MKake]
MASTER KEY FOR RECORDING AND REPRODUCING DEVICE SIGNATURE KEY[MKdev]
400
RECORDING DEVICE

FIG. 86

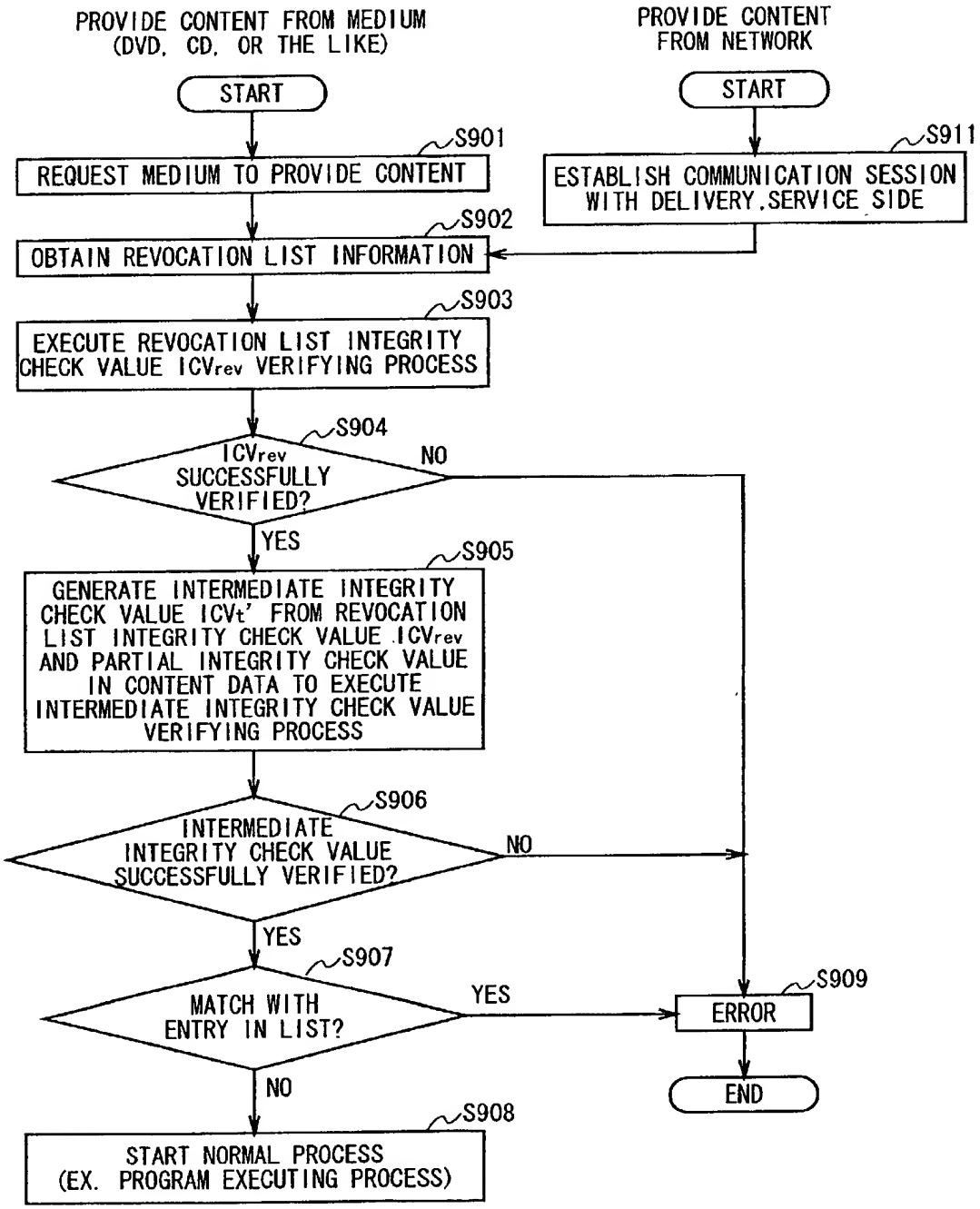

PROVIDE CONTENT FROM MEDIUM (DVD, CD, OR THE LIKE)
START
S901
REQUEST MEDIUM TO PROVIDE CONTENT
S902
OBTAIN REVOCATION LIST INFORMATION
S903
EXECUTE REVOCATION LIST INTEGRITY CHECK VALUE ICVrev VERIFYING PROCESS
S904
ICVrev SUCCESSFULLY VERIFIED?
NO
YES
S905
GENERATE INTERMEDIATE INTEGRITY CHECK VALUE ICVt' FROM REVOCATION LIST INTEGRITY CHECK VALUE ICVrev AND PARTIAL INTEGRITY CHECK VALUE IN CONTENT DATA TO EXECUTE INTERMEDIATE INTEGRITY CHECK VALUE VERIFYING PROCESS
S906
INTERMEDIATE INTEGRITY CHECK VALUE SUCCESSFULLY VERIFIED?
NO
YES
S907
MATCH WITH ENTRY IN LIST?
YES
NO
S908
START NORMAL PROCESS (EX. PROGRAM EXECUTING PROCESS)
PROVIDE CONTENT FROM NETWORK
START
S911
ESTABLISH COMMUNICATION SESSION WITH DELIVERY.SERVICE SIDE
S909
ERROR
END

FIG. 87

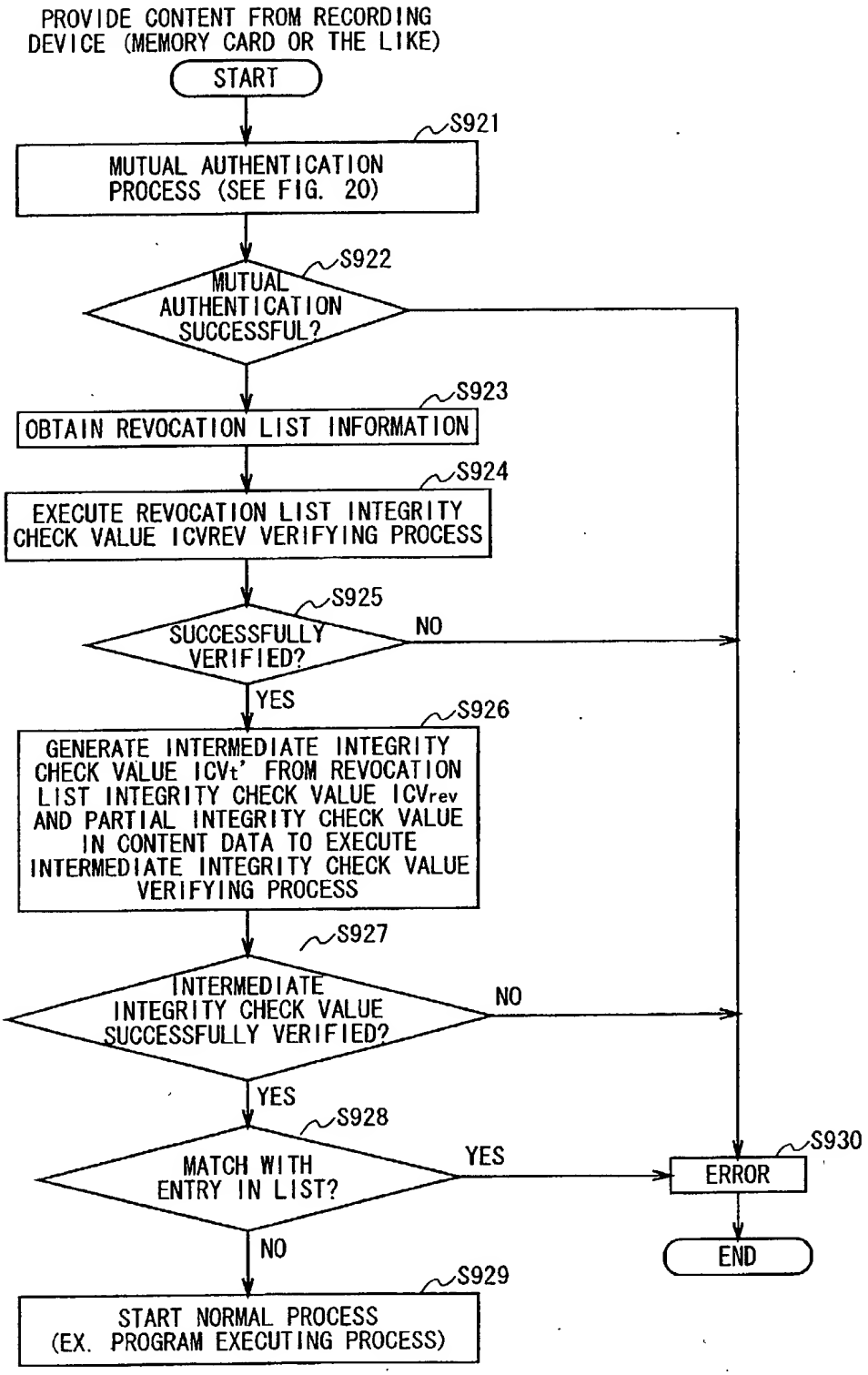

PROVIDE CONTENT FROM RECORDING DEVICE (MEMORY CARD OR THE LIKE)
START
S921
MUTUAL AUTHENTICATION PROCESS (SEE FIG. 20)
S922
MUTUAL AUTHENTICATION SUCCESSFUL?
S923
OBTAIN REVOCATION LIST INFORMATION
S924
EXECUTE REVOCATION LIST INTEGRITY CHECK VALUE ICVREV VERIFYING PROCESS
S925
SUCCESSFULLY VERIFIED?
NO
YES
S926
GENERATE INTERMEDIATE INTEGRITY CHECK VALUE ICVt' FROM REVOCATION LIST INTEGRITY CHECK VALUE ICVrev AND PARTIAL INTEGRITY CHECK VALUE IN CONTENT DATA TO EXECUTE INTERMEDIATE INTEGRITY CHECK VALUE VERIFYING PROCESS
S927
INTERMEDIATE INTEGRITY CHECK VALUE SUCCESSFULLY VERIFIED?
NO
YES
S928
MATCH WITH ENTRY IN LIST?
YES
S930
ERROR
END
NO
S929
START NORMAL PROCESS (EX. PROGRAM EXECUTING PROCESS)

FIG. 88

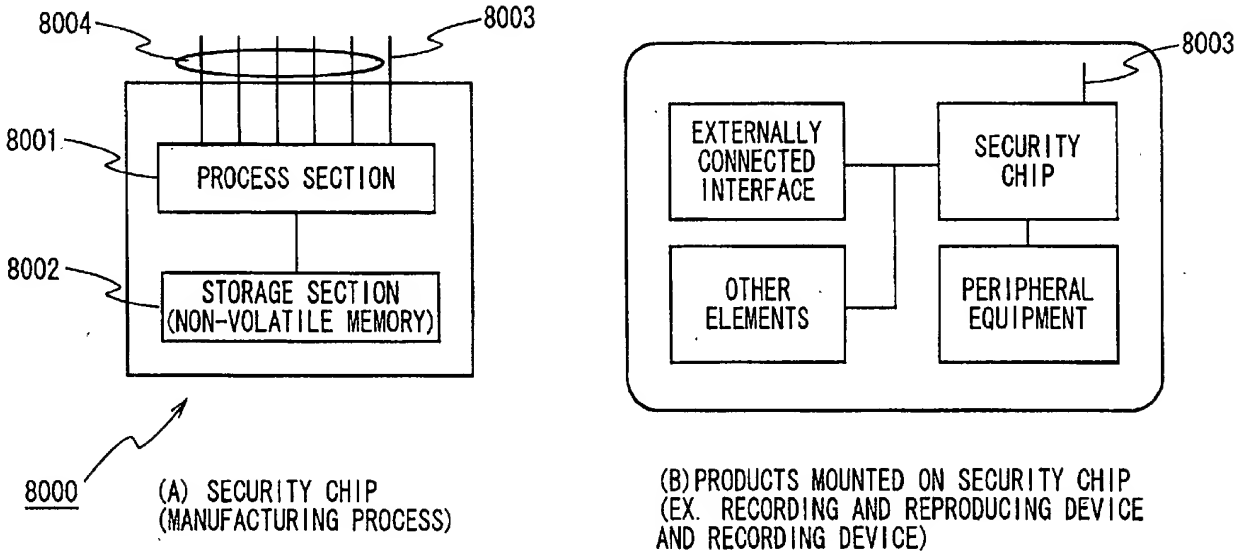


FIG. 89

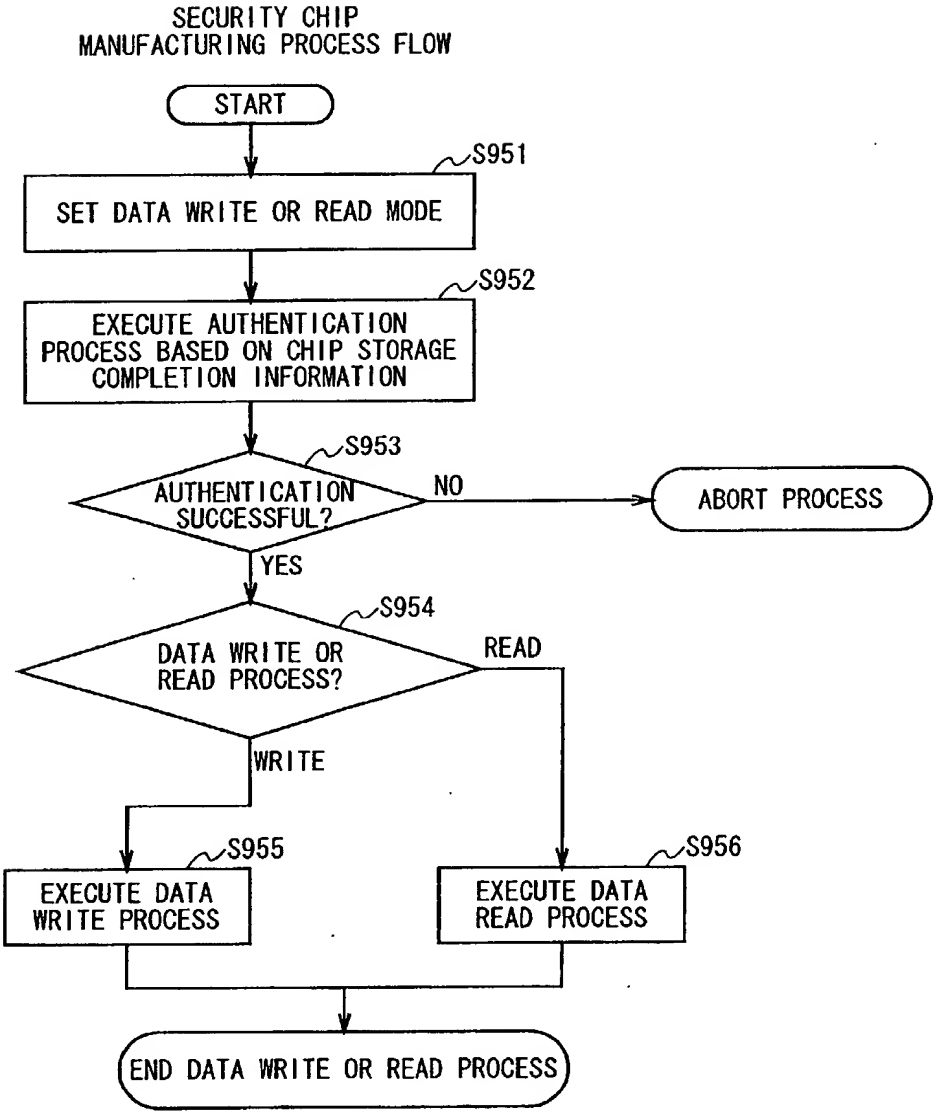
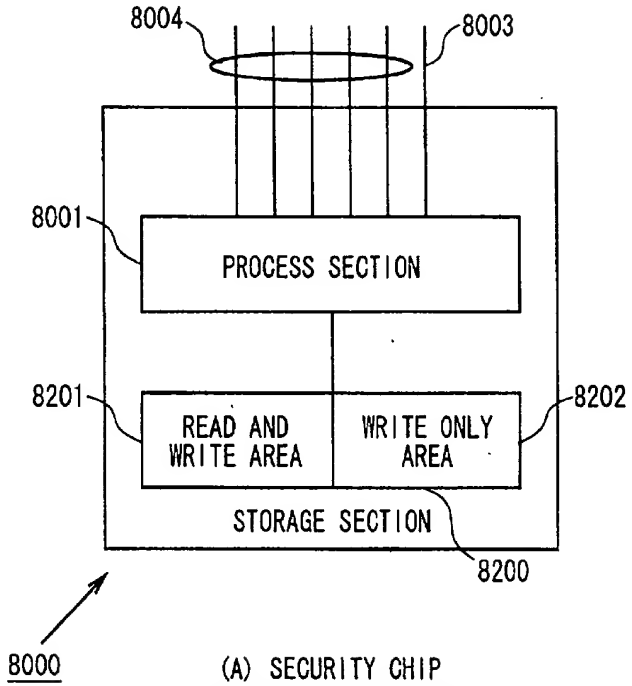
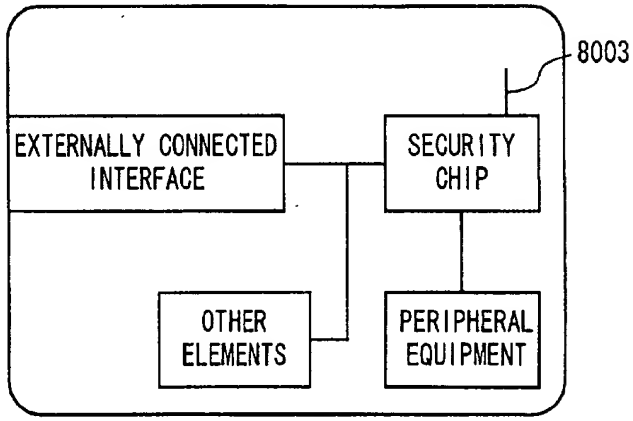

SECURITY CHIP
MANUFACTURING PROCESS FLOW
START
S951
SET DATA WRITE OR READ MODE
S952
EXECUTE AUTHENTICATION PROCESS BASED ON CHIP STORAGE COMPLETION INFORMATION
S953
AUTHENTICATION SUCCESSFUL?
NO
ABORT PROCESS
YES
S954
DATA WRITE OR READ PROCESS?
READ
WRITE
S955
EXECUTE DATA WRITE PROCESS
S956
EXECUTE DATA READ PROCESS
END DATA WRITE OR READ PROCESS

FIG. 90



(A) SECURITY CHIP
(MANUFACTURING PROCESS)



(B) PRODUCTS MOUNTED ON SECURITY CHIP
(EX. RECORDING AND REPRODUCING DEVICE AND RECORDING DEVICE)

FIG. 91

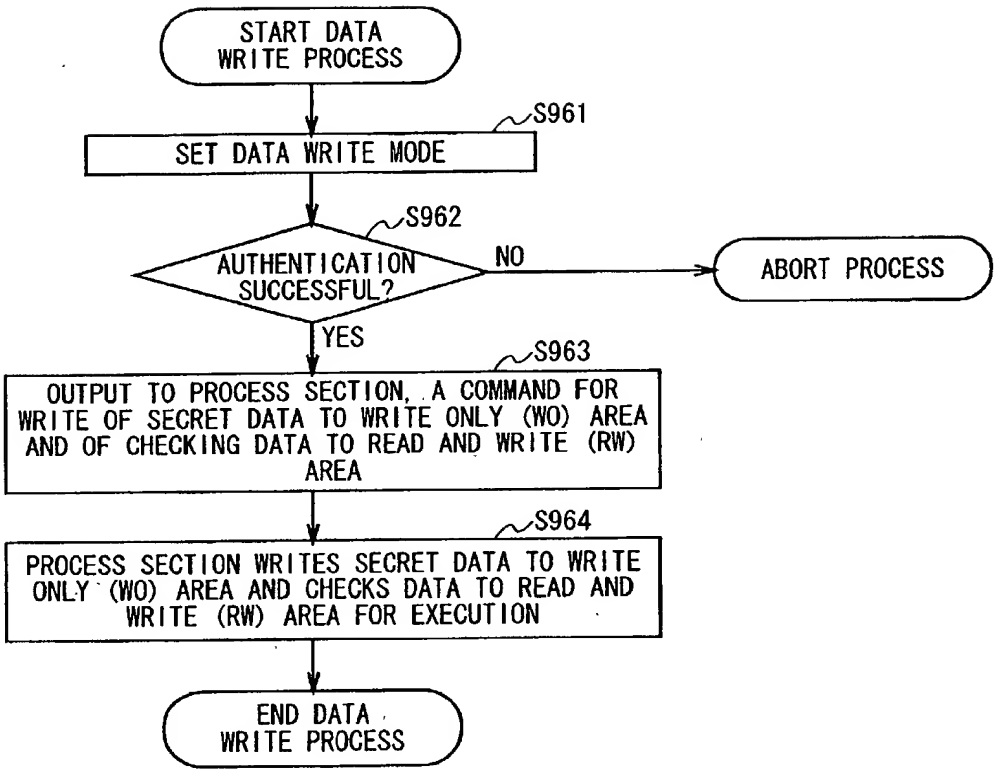

START DATA WRITE PROCESS
S961
SET DATA WRITE MODE
S962
AUTHENTICATION SUCCESSFUL?
NO
ABORT PROCESS
YES
S963
OUTPUT TO PROCESS SECTION, A COMMAND FOR WRITE OF SECRET DATA TO WRITE ONLY (WO) AREA AND OF CHECKING DATA TO READ AND WRITE (RW) AREA
S964
PROCESS SECTION WRITES SECRET DATA TO WRITE ONLY (WO) AREA AND CHECKS DATA TO READ AND WRITE (RW) AREA FOR EXECUTION
END DATA WRITE PROCESS

FIG. 92

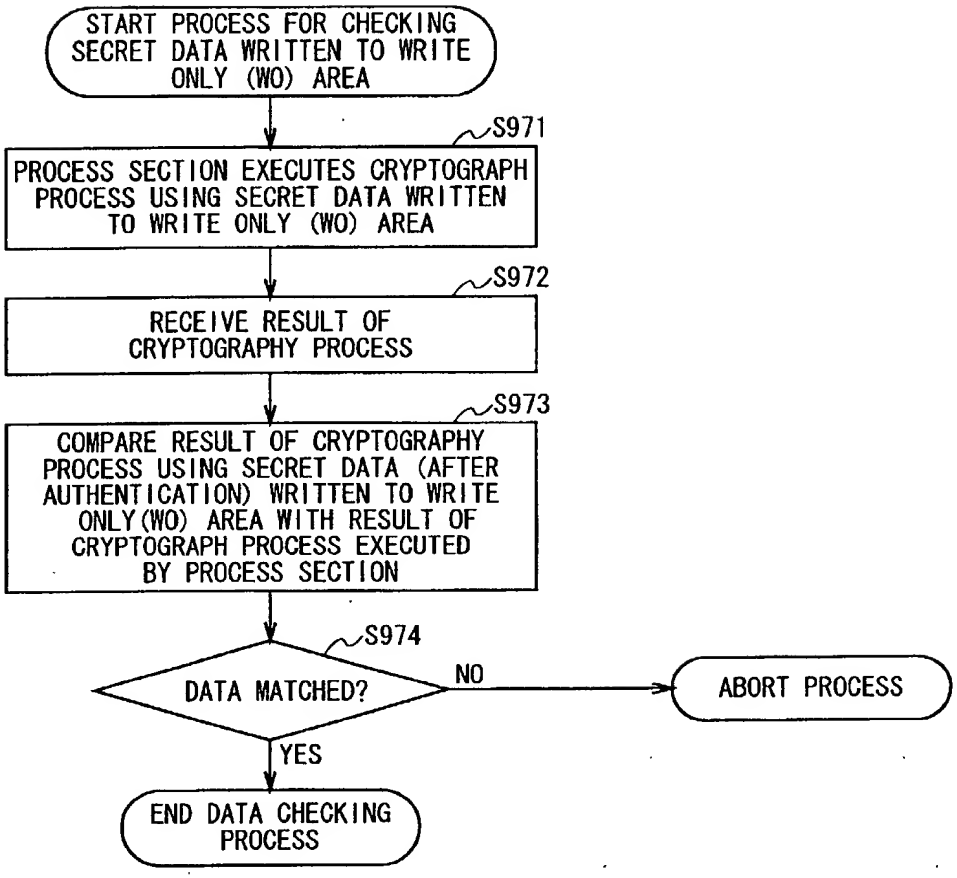

START PROCESS FOR CHECKING SECRET DATA WRITTEN TO WRITE ONLY (WO) AREA
S971
PROCESS SECTION EXECUTES CRYPTOGRAPH PROCESS USING SECRET DATA WRITTEN TO WRITE ONLY (WO) AREA
S972
RECEIVE RESULT OF CRYPTOGRAPHY PROCESS
S973
COMPARE RESULT OF CRYPTOGRAPHY PROCESS USING SECRET DATA (AFTER AUTHENTICATION) WRITTEN TO WRITE ONLY(WO) AREA WITH RESULT OF CRYPTOGRAPH PROCESS EXECUTED BY PROCESS SECTION
S974
DATA MATCHED?
NO
ABORT PROCESS
YES
END DATA CHECKING PROCESS

FIG. 93

Explanation of Reference Numerals

106...main CPU, 107...RAM, 108...ROM, 109...AV process section, 110...Input process section, 111...PIO, 112...SIO, 300...recording and reproducing device, 301...control section, 302...cryptography process section, 303...recording device controller, 304...read section, 305...communication section, 306...control section, 307...internal memory, 308...encryption/decryption section, 400...recording device, 401...cryptography process section, 402...external memory, 403...control section, 404...communication section, 405...internal memory, 406...encryption/decryption section, 407...external memory control section, 500...medium, 600 communication means, 2101, 2102, 2103...recording and reproducing device, 2104, 2105, 2106...recording device, 2901...command number managing section, 2902...command register, 2903, 2904...authentication flag, 3001...speaker, 3002...monitor, 3090...memory, 3091...content analysis section, 3092...data storage section, 3093...program storage section, 3094...compression decompression process section, 7701...content data, 7702...revocation list, 7703...list check value, 8000...security chip, 8001...process section, 8002...storage section, 8003...mode signal line, 8004...command signal line, 8201...read write area, 8202...write only area.